VENTY-NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

JAN 12 1934

CONTENTS INDEX PAGE 7

THE IRON AGE

RODUCTION -:- MANAGEMENT JANUARY 11, 1934 PROCESSES -:- NEWS

INDUSTRY

Becomes articulate . . . again

DID YOU ever see a fighter in the ring, gasping for breath, parrying blows mostly with his chin . . . just "taking it" until the end of the round?

Industry has been in that condition, but has regained its wind, its composure to some extent, and a fighting heart is pouring fresh energy right down to the finger tips with every throb. Industry has gotten its second wind . . . and industry becomes articulate again.

The voice of industry is advertising . . . a universal language spoken by all the leaders of industry, and thoroly understood.

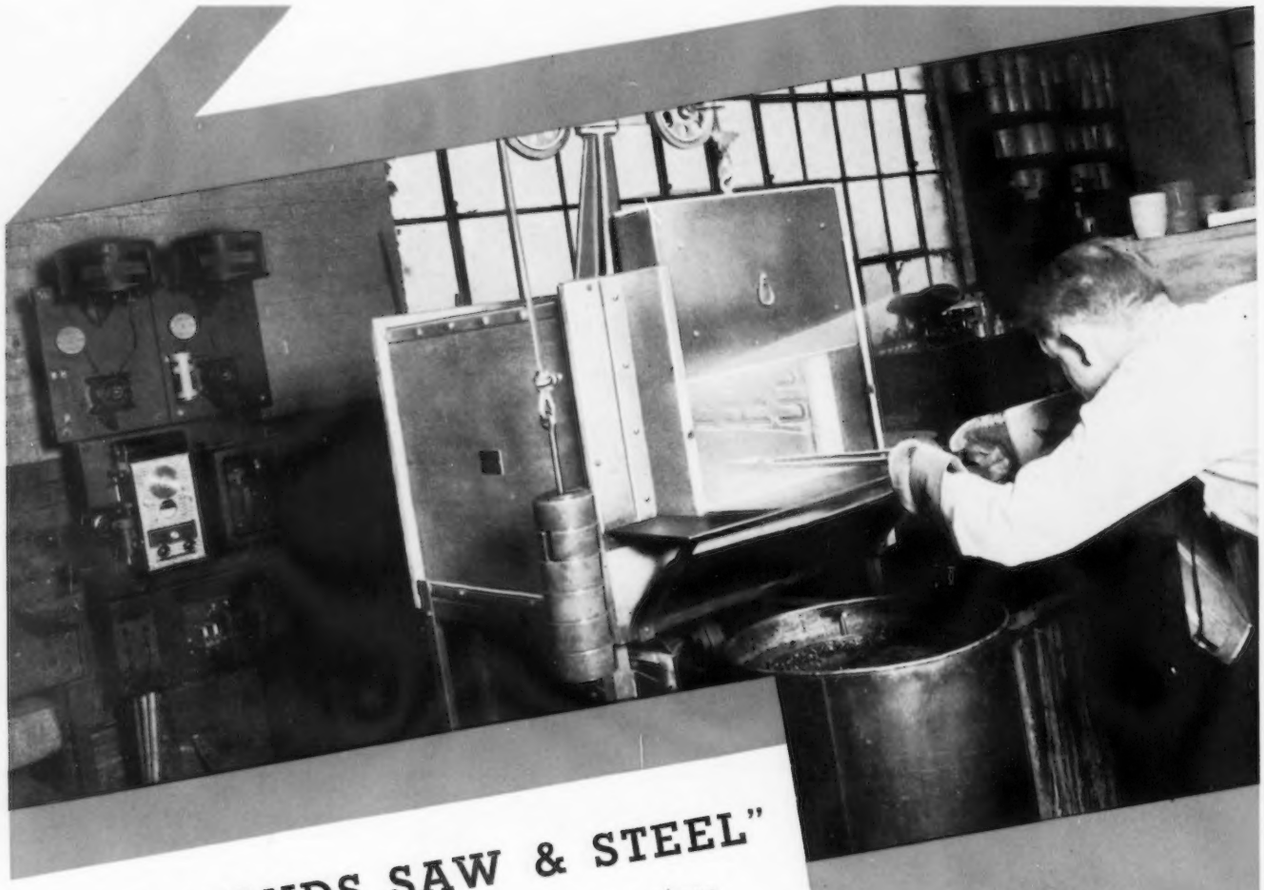
Industry cannot afford many "bird dog" salesmen. Advertising has to locate prospects, brief the story, provide adequate information. Industrial advertising is largely news, and almost invariably, facts unadorned. It must always speak the truth.

A new hobbing machine is announced. Fifty thousand men in industry read of it within a few days . . . and make a mental note of it. A new bearing makes a record for itself . . . and fifty thousand men read of that within a week. A better way to harden steel, a new use for welding, another alloy composition . . . and in ten thousand heat treating departments, in ten thousand welding shops, in ten thousand tool rooms . . . someone is interested, *all simultaneously.*

After all, advertising SHOULD be news, and generally is, following a discovery of a new method, a new product or a new use for a product. Read of industry's progress in your trade and business periodicals . . . for industry is saying something you should hear . . . *industry is articulate . . . again.*

REPRINTED THROUGH THE COURTESY OF JOHN C. STEPHAN, CLEVELAND, OHIO

If Mr. Stephan had been speaking specifically of the Metal Working Industry and The Iron Age his remarks could hardly have been more pointed. *352 "voices" in this industry were heard in the January 4 issue. 74 of these were new voices many of which will continue to speak to the 45,000 readers of The Iron Age during 1934. * "The voice of industry is advertising . . . . ". The Metal Working Industry speaks through The Iron Age.



Re: "SIMONDS SAW & STEEL"

For the past 9 years, the Simonds Saw & Steel Co. have been using this Hoskins electric furnace in their laboratory to learn how to make their steel better. The prime element in all laboratory work is control, and that is why this one uses electric heat for establishing metallurgical facts—so that you get the maximum results from their products. Regarding the Hoskins furnace, Mr. Bulmore says it has good insulation, that the CHROMEL hair-pin units are durable and easy to replace. If for your work you want the finest possible control of some heat-treating job, we suggest you investigate electric heat and Hoskins furnaces. The furnaces are made in box and pot types of several sizes, good for temperatures up to 2000° F. Our Catalog 53-G contains information that is likely to be useful to you. Send for a copy. Hoskins Manufacturing Co., Detroit, Mich.

Chromel

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HOSKINS
Electric
FURNACES

THE IRON AGE, published every Thursday by the *IRON AGE PUBLISHING CO.* Publication Office: N. W. Cor. Chestnut & 56th Sts., Philadelphia, Pa. Executive Offices: 239 W. 39th St., New York, N. Y., U. S. A. Entered as second class matter at the Post Office at Philadelphia under Act of March 3, 1879. $6.00 a year in U. S., Canada $8.50, Foreign $12.00. Vol. 133, No. 2.

THE IRON AGE — January 11, 1934

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Contents

How to Raise Farm Prices 9
Making Chevrolet Transmission Gears 10
Finish Helps Metal Products Sales 14
Metallurgical Achievements in 1933 18
Progress in the Foundry in 1933 23
Steel Capacity Expanded Little in 1933 25
Survey of the Metal-Working Industry 27
New Materials and Processes 29
New Equipment 31
News 33B
December Ingot Output 34
December Pig Iron Production 35
Washington News 35A
Personals and Obituaries 35D
Automotive Industry 37
Markets 39
Construction and Equipment Buying 56
Products Advertised 64
Index to Advertisers 82

THE IRON AGE PUBLISHING COMPANY

F. J. FRANK, *President* G. H. GRIFFITHS, *Secretary* C. S. BAUR, *General Advertising Manager*

PUBLICATION OFFICE: N. W. Corner Chestnut and 56th Sts., Philadelphia, Pa.

EXECUTIVE OFFICES: 239 West 39th St., New York, N. Y., U. S. A.

Member, Audit Bureau of Circulations
Member, Associated Business Papers

Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50, including duty; Foreign $12.00 a year. Single Copy 25 Cents

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SEVENTY-NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

Ryerson Specializing on the finer Steels—

Your competitors are burning the midnight oil economizing—improving their products. So are you! And it is the newer, finer steels that are accomplishing miracles. The new stainless steels, high manganese alloys, new process tool steels, special accuracy bars, etc., etc.—these and many others are responsible.

For this reason the Ryerson Special Steel Divisions are working overtime helping manufacturers whenever the problem of steel arises. We have an experienced group of special steel men awaiting your beck and call, and we hope you will take full advantage of this most important service.

Do not let well enough alone. Do not be too easily satisfied. Call on Ryerson for suggestions that will economize and improve your product. We will be glad to help you.

Write for the Ryerson Steel Book, guide to the most complete stocks ready for immediate shipment.

HOT ROLLED ALLOYS
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COLD DRAWN ALLOYS
S.A.E. 2315, 2320, 2330, 3115, 3120, 3135, etc.

HEAT TREATED ALLOYS
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COLD FINISHED STEELS
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XX, X
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(Best for Dies)
"4-Point" Chisel Steel
High Speed Mill Treated Bars
Diamond B
High Speed Tool Holder Bits
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GENERAL STEEL PRODUCTS
Bars, Structurals, Plates, Sheets, Refined Iron, Shafting, Strip Steel, Welding Rod, Tubes, Babbitt Metal, bolts, nails, etc., are also carried in stock for immediate shipment.

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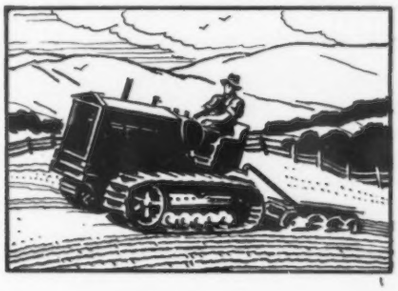
JANUARY 11, 1934

ESTABLISHED 1855

Vol. 133, No. 2



How to Raise Farm Prices

▼ ▼ ▼

IN the endeavor to raise the prices of farm products, one sure but simple method is apparently being overlooked.

It is a tried and tested method which is now being applied in industry and which is raising the prices of the products that the farmer buys with the money that he receives from the products that he sells.

Why not insist on a general unionization of farm labor, a 35 or 40-hour farm work week and an enforced minimum wage? That will raise the prices of farm products in short order.

Of course, Congress would have to make farm union recognition mandatory in order to make this work, but why strain at the gnat and swallow the camel? For Congress will probably attempt to make unionization mandatory in industry and might as well kill two birds with one stone.

The bricklayers' union rigidly restricts the number of bricks that a member can lay per diem. Why not restrict the number of beans that a bean picker can pick? That will help to raise the price of beans.

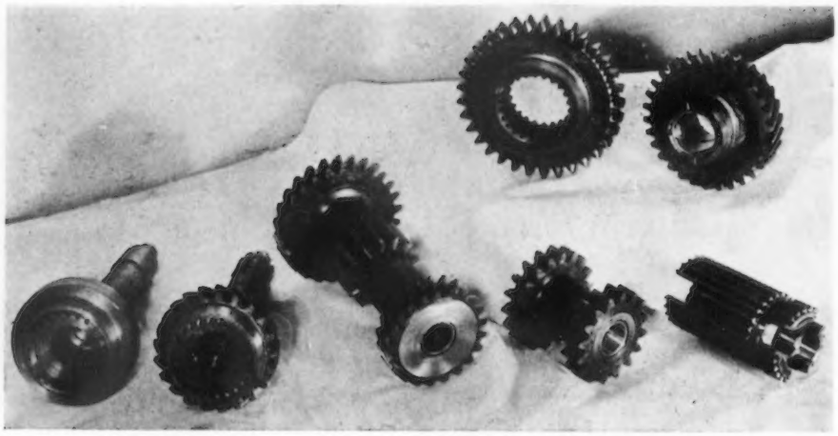
The painters' union forbids its members to use a paint brush over four inches wide. Why not prohibit the use of both hands in milking? That will raise the price of milk.

The motion picture projectors' union insists on two men to each projector. Why not put two men on each manure fork? That will raise manure.

We asked a farmer to read this editorial before it was published. He said it was silly—that raising farm prices wouldn't do him any good if his costs were forced up in proportion and his net earnings were no larger. And that Congress had enough respect for the farmer's vote not to attempt to foist anything like this on him.

We hope so. And we hope that the farmer will realize that any attempt at forced unionization of industry will hurt him just as severely, since the real value of his income is measured by the prices of what he can buy with it.

Coal is now unionized. Have you bought any lately?



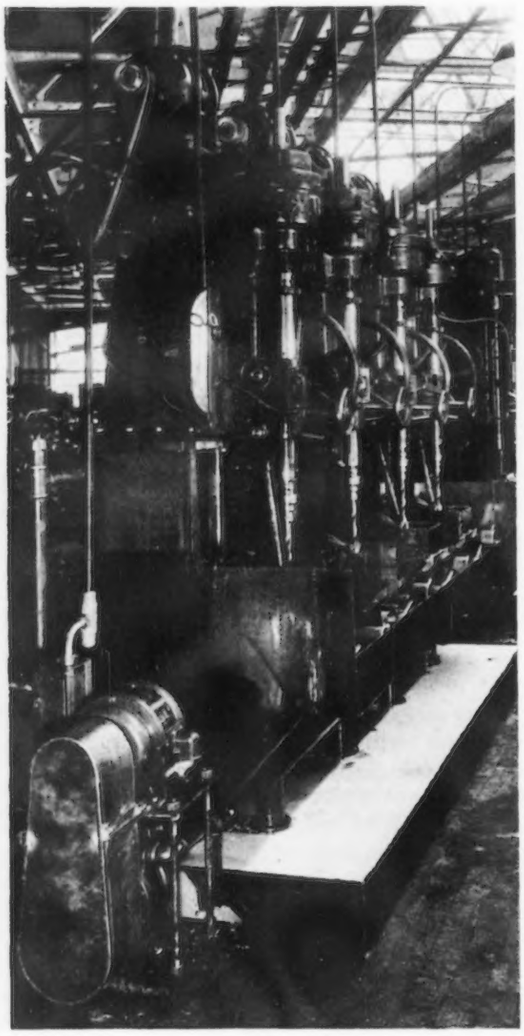
Gears going into Chevrolet transmission (left to right): Clutch gear (internal teeth not punched), clutch gear finished, countershaft gear, idler gear, second and third speed clutch. In background is first and reverse gear at left and second speed gear at right.

Making

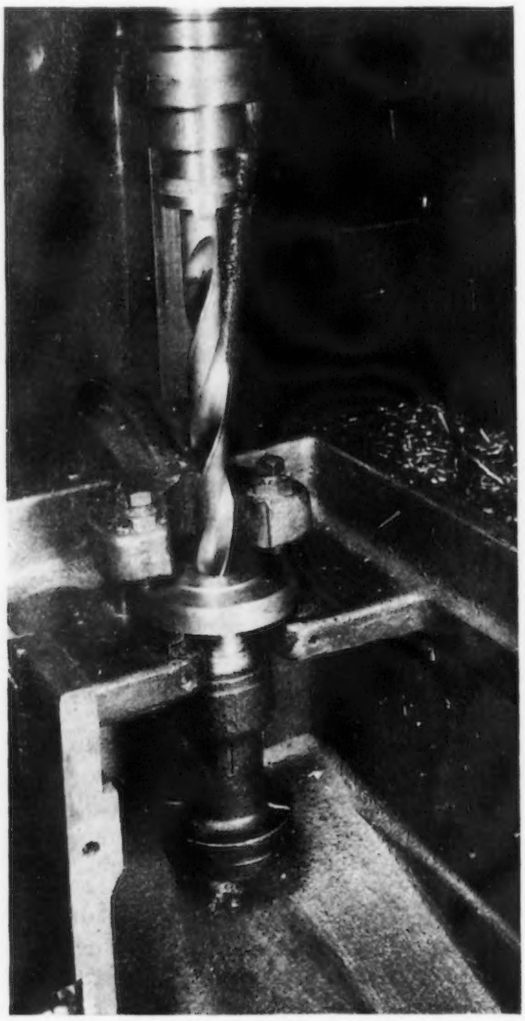
By BURNHAM FINNEY
Detroit Editor, THE IRON AGE

IN the manufacture of its passenger cars and trucks the Chevrolet Motor Co. produces a large percentage of the major parts in its own plants. At its Toledo, Ohio, plant it turns out all of its own transmissions. This factory is equipped with both precision and production machinery of the most modern design which makes possible the assembly of transmissions and the machining of transmission parts at a low cost. It is the savings accomplished by means of modern machine tools and of proficient shop methods which enable the Chevrolet company to put such a modest price on its cars.

No part of an automobile needs



(At Left): Center hole is finish drilled through length of countershaft on four-spindle gang type vertical drilling machine equipped with continuous base. Motor for each spindle is mounted on top. Coolant for entire unit is pumped by separate motor (in foreground).



(At Right): Each spindle of vertical drilling machine has a special fixture to locate the work from the turned head and the drilled hole.

Chevrolet Transmission Gears—I

CHEVROLET builds all of its transmissions in a special plant at Toledo, Ohio, equipped with the latest type of production machinery. The machining of the gears is described in this article. The process of making internal teeth for the clutch gear and second speed gear is unusual because the teeth are chamfered prior to being punched. A second article will describe heat treating and gear testing methods.

such constant and close supervision throughout the manufacturing process as transmission gears. Especially is this true since motorists have been educated to expect silent shifting of gears and elimination of practically all noise from transmission in service. Chevrolet had this thought foremost in mind when it set up its gear fabricating system at Toledo.

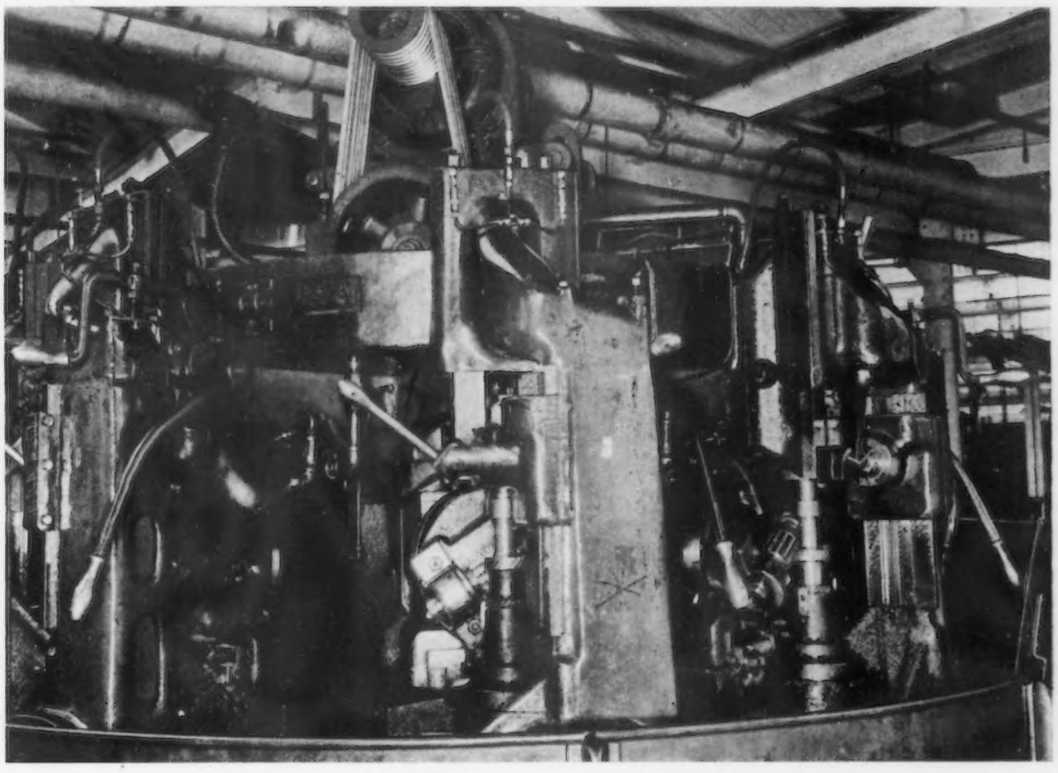
Going into each Chevrolet passenger car transmission are the following gears: countershaft gear, clutch gear, second speed gear, first and reverse gear, second and third speed clutch gear, and idler gear. Perhaps the most interesting gear to follow through the shop is the countershaft gear. It consists of a 25-tooth helix gear on the large end, a 21-tooth helix gear on the small end and a 13-tooth spur gear in the center.

The pitch of the teeth of the helix gear on the large end is 9.25, the pressure angle 16½ deg., the tooth thickness 0.1655 to 0.1640, the helix angle 42 deg., 12 min. 45.8 sec., and the lead of the helix 12.6372 in. The pitch, pressure angle and tooth thickness of the gear at the small end are the same as those of the gear at the large end, but the helix angle is 34 deg., 47 min., 55.5 sec. and the lead of the helix 12.49749 in. The center spur gear has a pitch of 7, a pressure angle of 20 deg. and tooth thickness of 0.2735 in. to 0.2720 in. The steel for the countershaft gear is made to G.M.C. 6150-A specifications.

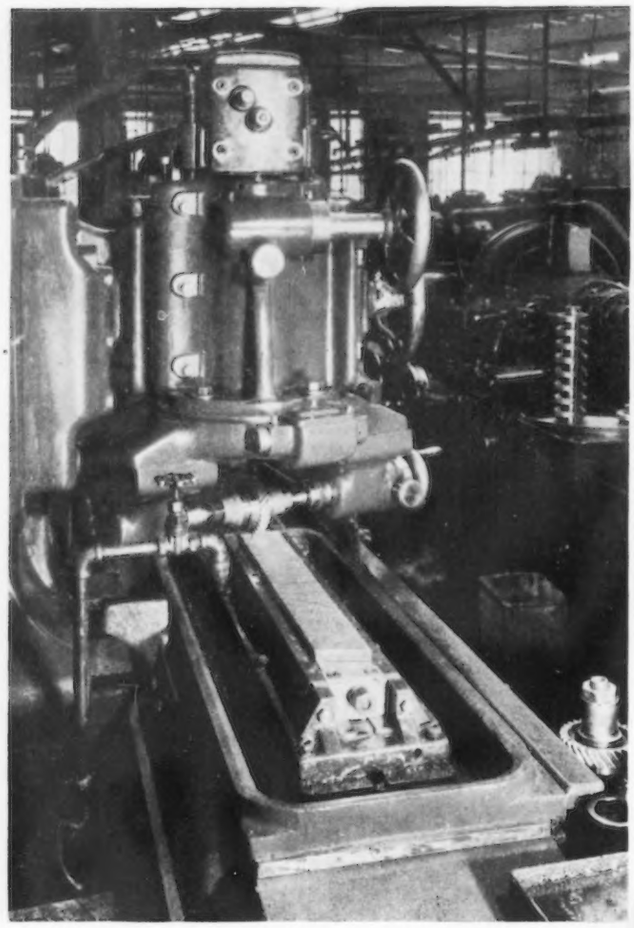
First Operations on Forgings

Rough forgings come into the plant from the Chevrolet forge shop at Detroit. After being annealed and the scale removed, they are Brinell tested. The large end is turned and the center hole drilled on a Mult-Au-Matic machine with a special chuck to hold the work in place. This rotary machine, having six stations, turns out 45 pieces per hour.

The hole is finish drilled through the length of the forging, a distance of 7 3/16 in., on a four-spindle gang type vertical drilling machine provided with a continuous base. Each spindle is equipped with a special fixture for locating the work from the turned head and the drilled hole. The motor which runs each spindle is mounted on the top and the coolant for the entire unit is pumped by a separate motor. Because the machine is set up for this particular operation,



Teeth on either end of countershaft gears are rough and finish hobbed and teeth of center spur gear rough hobbed on eight-station rotary automatic hobbing machines.



To secure smooth tooth surface and to correct form and angle, countershaft gears are put through shaving machines. In first machine the 21 teeth of helix gear at small end are shaved and in second machine the 25 teeth of helix gear at large end.

unnecessary parts have been eliminated. Slip gears are provided for both the speed and feed train so that the machine can quickly be set up for other speeds and feeds at any time.

After the oil hole, ⅜ in. in diameter, is drilled on a small drill press and rough broached on a horizontal broaching machine, two drive holes are drilled on a two-spindle vertical drilling machine. The small end of the countershaft gear then is turned on a Mult-Au-Matic machine and finish broached on a horizontal broaching machine. Both the large and small ends are faced in separate operations on a vertical drill press.

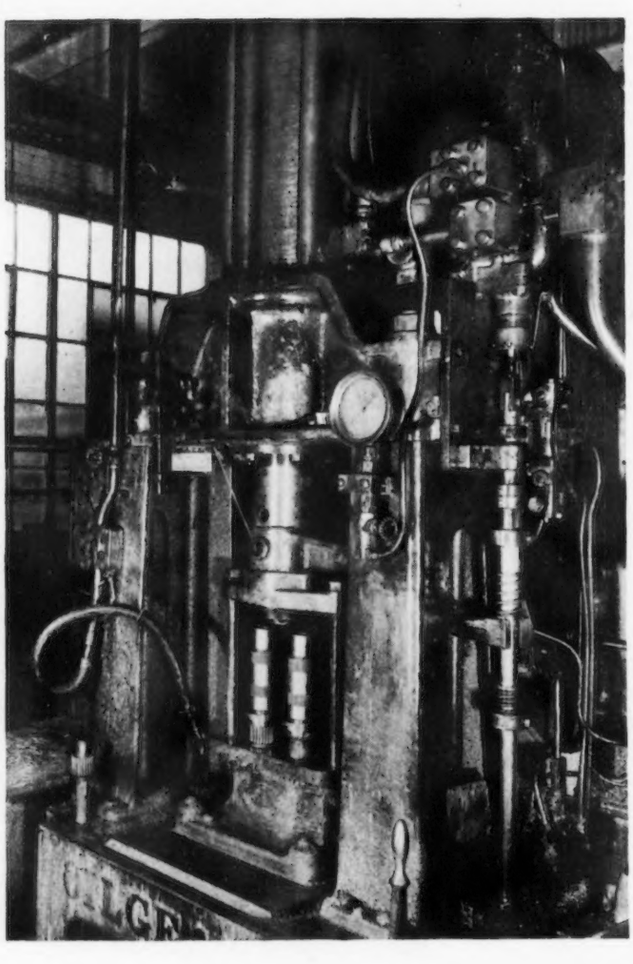
Teeth on either end of the countershaft gears are rough and finish hobbed and the teeth of the center spur gear are rough hobbed on a rotary automatic hobbing machine with eight stations. Production on this machine averages 55 of the 21-tooth gears an hour and 102 of the 13-tooth gears. The spur gear teeth then are chamfered and finish hobbed on an automatic hobbing machine, and checked for size on a special machine.

To secure a smooth tooth surface and to correct tooth form and angle, countershaft gears are put through shaving machines. In the first machine the 21 teeth of the helix gear at the small end are shaved and in the second machine the 25 teeth of the helix gear at the large end. Completely controlled by a hydraulic unit, the machine is equipped with a horizontal cutting rack resting on the table. The operator mounts the gear on an arbor and starts the table traveling automatically by a lever.

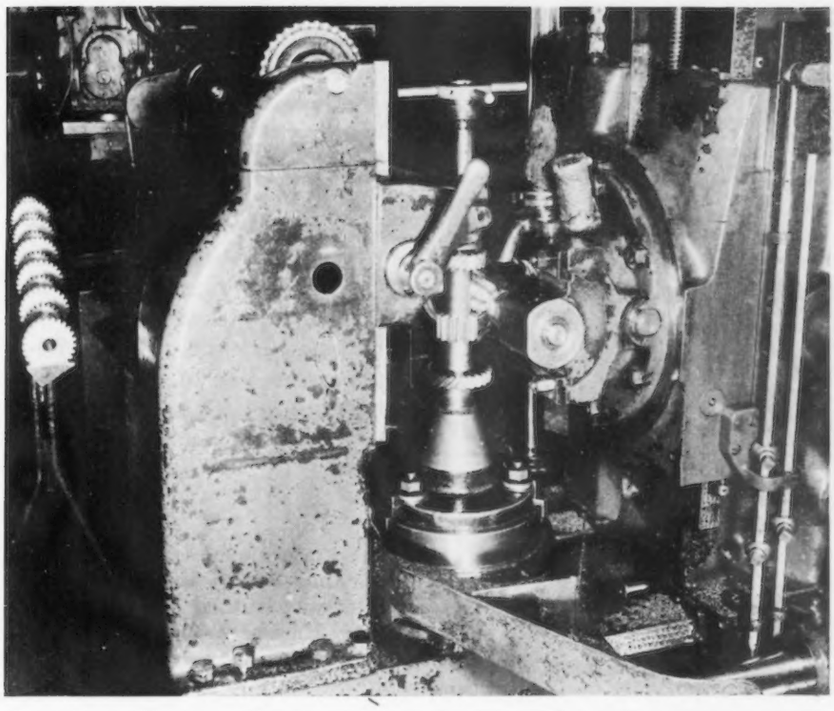
After the table makes the proper number of strokes, the head automatically raises and the table stops so that the operator may remove the finished gear and insert another one. The checking of the gear teeth immediately preceding this operation guards against excessive stock being left on the teeth for shaving.

Three slots are punched in both ends of the countershaft gear to lock in the bushings during the assembly of the transmission. The teeth of all three gears on the shaft are burnished in an air-controlled General Motors burnishing machine, the gears being run between hardened and ground burnishers. A complete turn of the gear and reverse back to the original position constitute the operating cycle. The machine is motor driven.

Machining operations on other gears which make up the transmission



In the process of making internal teeth on the clutch gear and second speed gear, the teeth are punched in a 25-ton vertical hydraulic press and finish punched in a similar machine. Each machine has two dies, and at each stroke of the press two punching operations are performed.



Spur gear teeth on countershaft are finish hobbed on automatic hobbing machines.

are similar to those on the countershaft gear, except on the clutch gear and the second speed gear. Both of them possess internal teeth which are made by the same process for both gears. The first operation is to drill 24 clutch holes, each 7/64 in. in diameter, on a vertical drilling machine equipped with self-indexing, rotating head. Eight holes are drilled simultaneously, 24 holes at one setting.

After the chamfering operation, the gear is rough punched in a 25-ton vertical hydraulic press and then finish punched in a similar machine. Each machine has two dies, and at each stroke of the press two punching operations are performed. The capacity of each machine is 250 pieces an hour.

The pitch of the internal teeth is 12-14, the pressure angle 27½ deg. and the circular width of the tooth space is 0.168 in. Any spacing error is not to exceed 0.002 in tooth to tooth.

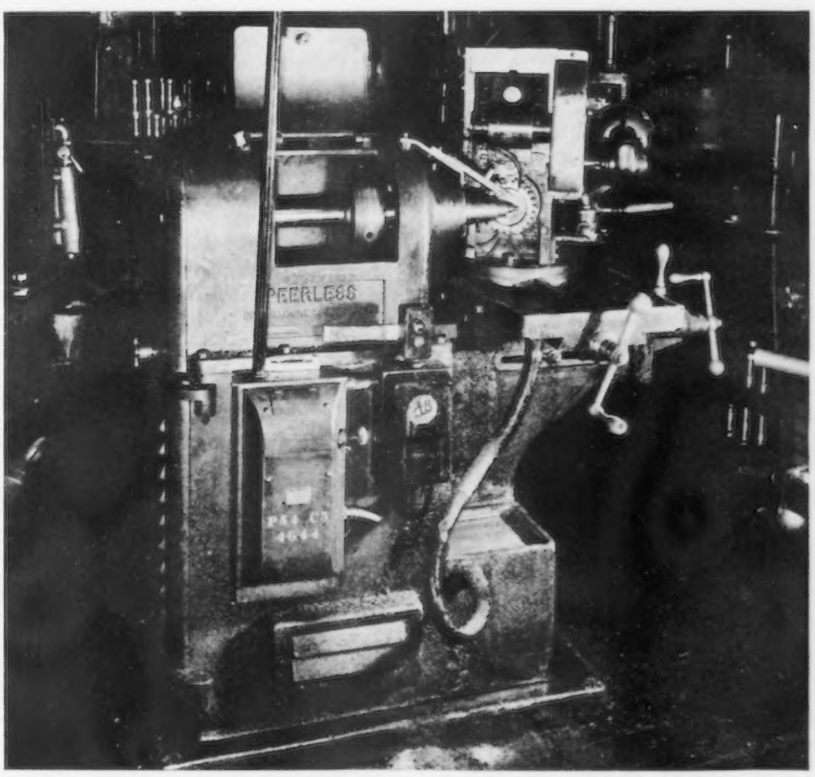
Tests Insulating Value of Thin Materials

AN instrument has been designed particularly for testing the dielectric strength (insulating value) of sheet material, such as paper, gummed paper, cloth, varnished cambric and paper, rubber, mica and other insulating materials such as used in transformers, condensers, motors, electrical appliances and devices, etc. Means are also provided for testing completed units, such as transformers, coils, insulated wire, etc.

The determination of the dielectric strength of an insulating material requires that a sample be placed in an electrical field of sufficient intensity to disrupt or break down the molecular structure of the material under test. The instrument developed is self-contained in a metal case finished in black crystal baked enamel. A transformed secondary delivers a maximum potential of 10,000 volts. This winding is grounded at its exact center so that the highest potential to ground never exceeds 5000 volts. The work circuit across the secondary is also balanced to ground with the meter at the center. A Weston vane-type meter using a 10-milliampere field coil is used in conjunction with two sets of resistors to measure the voltage across the test sample. The meter is calibrated in three ranges, to facilitate the testing of a wide variety of materials.

The secondary circuit is designed so that the instant a breakdown in the test sample occurs the voltage as indicated on the meter drops to approximately zero, thus providing a direct means for reading the actual potential at which the insulation failure occurred. Smooth, gradual control of voltage is obtained by means of a large tapered rheostat inserted in series with the transformed primary. The rheostat comprises a long cylindrical ceramic tube wound with nicrome wire, suitably tapered, and a slider driven by means of a helical screw so that extremely fine adjustment of voltage is obtained by means of an external control handle.

The instrument is manufactured by Sound Engineering Corpn., 416 North Leavitt Street, Chicago. It is 8¼ x 16 x 18½ in. in size, weighs 65 lb., and ordinarily can be used on a 110-volt 60-cycle source of power.



Process of making internal teeth on clutch gear and second speed gear is unusual because teeth are chamfered prior to rather than after the punching operation.

How Attractive Finish Helps Metal Products Sales

7—Pickling as a Manufacturing Process

By HERBERT R. SIMONDS

IF we consider pickling as an established link in the manufacturing sequence of a product, we find immediately that the process is subject to a new type of analysis. It is to be scrutinized from the viewpoint of floor space and of material handling methods. The significance of preceding and succeeding operations should be studied with particular attention to such subjects as labor and supervision, operators' clothing, different types of floor material, cost of power and fuel, effect of fumes on other operations, and eventually, of course, the effect of the quality and extent of the pickling on the product itself. In previous articles the relation of a clean metal surface to a good finish has been described. Assume that a finish of a definite quality is to be maintained and it becomes possible to investigate pickling on the basis of overall cost as well as of actual pickling cost.

Many medium-sized plants in the metal working industry are faced at present with problems in connection with their pickling operations. It is fairly safe to say that any plant with a pickling department designed as much as ten years ago will be able to effect an economy by reorganizing to take advantage of the recent improvements in equipment and materials. This would be particularly true of a plant having a straight line of production which is interrupted at some intermediate point for a side trip to and from a separate pickling room. The modern method is to locate the individual pickling unit directly in the production line and thus to greatly reduce handling time and expense.

Some Pickling Difficulties

The necessity for removing scale from metal in many cases and the economic advantage of removing it in other cases have been described. Pickling often is the most convenient method for such scale removal, but it is not the only method and it is far from being an ideal process. Therefore, in a discussion of the subject it is only fair to take full account of the difficulties of conventional practice.

The salts of iron formed during the chemical attack of pickling solutions on metal are by-products which so far have proved useless. Because of the formation of these salts it is necessary to dump or throw away solutions containing still active acids. If solutions are not dumped before saturation has been reached, the deposit of salt crystals creates a new and expensive cleaning problem, yet if active acids are thrown away, that not only represents a definite loss but frequently presents a problem from the standpoint of stream pollution or of damage to sewers and sewage disposal systems.

One of the immediate objections to pickling is that it usually pits and etches metal surfaces, thus reducing and unevenly altering dimensions. Cold work strains produce areas in metal which are more readily attacked by pickling acids than the nonstrained areas. Thus in severe drawing, the thinner sections at corners are usually more rapidly attacked by the pickling acids and hence the already thin condition is aggravated.

Acid Brittleness

When the pickling acids attack iron, hydrogen is formed and the absorption of this hydrogen is apt to cause brittleness which is known as acid brittleness. The conditions which favor the absorption of hydrogen are high temperature, dilute solutions, and long pickling time. An acid solution of moderate strength with temperature not over 150 deg. F. and the use of the shortest possible pickling time will frequently reduce acid brittleness to a negligible amount. However, the danger of reducing the pickling time to the minimum is that the scale may not all be removed and that subsequent operations may be more expensive accordingly.

This has been explained in a previous article, but perhaps may be ex-

ECONOMY IN GRINDING AFFORDED BY CLEAN METAL SURFACE
(This test was on hardened steel machine parts)

	Time Required for Surface Grinding		Time Required for Internal Grinding	
	After Scratch Brushing	After Electrolytic Descaling	After Scratch Brushing	After Electrolytic Descaling
Time per piece	54 min.	28 min.	6¾ min.	4½ min.
Per cent time saving	.....	48	.....	33⅓
Total wheel wear per piece ground	0.02 in.	0.008 in.	.....	.....
Wheel life	12 days	22 days	5 hr.	8 hr.
Gain in wheel life	.....	105 per cent	.....	60 per cent
Wheel size	8 in. x ¾ in.	8 in. x ¾ in.	1¾ in. x 1 in.	1¾ in. x 1 in.

"WHATEVER is packed in metal can be dressed up." This is the slogan of a large manufacturer of lithographed metal containers. To be "dressed up," metal must first be free of scale and this emphasizes the importance of pickling in the production of attractive metal finishes. In this second article on pickling, such subjects as acid brittleness, electrolysis, new economies, and continuous processes are discussed.

Surfaces such as this are possible only after the metal surface has been thoroughly descaled.

plained more graphically by the following table which shows the saving in grinding time due to having a clean surface to start with. This table was prepared by The Bullard Co. and the electrolytic process referred to is its own process. The scratch brush cleaning is said to be good average practice.

Testing Embrittlement

Another way of avoiding the absorption of hydrogen is to lessen the amount of it that is formed. Some inhibitors have the property of reducing hydrogen and one of the claims for a good inhibitor is that it avoids the danger of acid brittleness.

In addition to brittleness is the further difficulty of blistering. Slag inclusions in a rod or billet may be spread out into thread-like formations on the surface of the rolled product and in pickling, hydrogen enters these slag inclusions, or sonims, as they are called, and raises the surface of the metal into blisters.

Dr. Ian G. Slater of Birmingham University has devised a simple torsional test for determining the embrittling action of acids on medium and high carbon steel wires. In these he has found that rapid embrittlement ensues immediately the wires are immersed in the acid, and that the rate of deterioration increases with the acid concentration and the temperature. Hard drawn wire in the large gages is extremely sensitive to this embrittling effect. In his tests Dr. Slater found that the deterioration on the wire was less rapid when an inhibitor such as flour or yeast was added to the pickle. He states that a mixture of flour paste and stannous chloride solution was found particularly effective in reducing the embrittling effect.

Overcoming Embrittlement

Fortunately the embrittling action due to pickling is at least partially temporary in character, and the recovery of normal properties of the metal after pickling is facilitated with high temperature. Dr. Slater found that notched bar impact tests in several cases gave the surprising result that the steel had become toughened after pickling in sulphuric acid. Some steels showed embrittlement after similar treatment, and the difference in result is attributed to a difference in the characteristics of the steel and possibly to some extent in variations of the pickling time.

One method frequently used to recover the original properties of pickled products is to immerse them in boiling water and because of this feature it is the practice of some American manufacturers to use a boiling rinse and to keep the parts in this rinse longer than would be necessary merely to free them of the residual acids.

Use of Electricity

Numerous attempts have been made to use electric current to speed up the action of pickles and thus reduce the time required for descaling, but this tends to accelerate the destructive effect of the acid attack on the base metal under the scale and so has been discarded by many investigators. A few modifications of the method have proved successful, however. One of these known as the Bullard-Dunn process uses a plating action simultaneous with the descaling action to protect the base metal. In this process the work is usually connected to the cathode and as hydrogen gas lifts the scale, a microscopically thin, dense and adherent metal coating is electro deposited on the base metal from which the scale has just been lifted. This metal film protects the base metal against attack during any further descaling treatment. Consequently, areas from which the scale has already been lifted are protected from pitting or other distress during the additional time required to remove the thicker or more tenacious portions of the scale layer. This protective metal film is said to give the descaling bath an excellent "throwing power" so that the concentration of the process shifts automatically away from those areas from which the scale has been removed to those areas which are still covered with scale.

Continuous Pickling

The equipment used for this process is similar to that required for electroplating. The current usually is supplied by standard 6-volt direct current motor generator sets and stationary dip tanks or full automatic chain conveyors can be employed. In connection with the use of conveyors the sponsors point out that since there is no attack on a clean metal surface in the descaling bath of this process, the wear and tear on submerged parts of conveying equipment is small.

Another electric process is known as the Hanson-Munning bright dip. n this the products are immersed in two acid baths, as cathodes in the first and as anodes in the second. Quicker pickling and greatly lessened attack on the base metal are claimed.

The extension of pickling into an increasing variety of semi-final and

final manufacturing operations has centered attention on the development of special forms of handling apparatus. In line with the general tendency to use conveyors in large manufacturing operations, pickling in continuous machines has been worked out successfully in many new applications. An example is the recent use of continuous pickling machines to handle automobile wheel rims. In some cases a machine is lined up with a conveyor which carries the parts in a continuous sequence in and out of pickling baths, through electro-galvanizing or cadmium plating operations, through tanks where lacquer or paint is applied, and finally through an automatic drying machine.

Such a continuous process has presented many difficult maintenance problems. Avoidance of leaks in tanks is more important than ever. Fortunately, the items pickled in this way do not often require a deep tank, and a good job of lead lining is one way of securing a leak-proof tank. For general pickling in large tanks, however, lead lining is not always satisfactory because of the high maintenance costs arising from the need of frequent patching if the lead starts to sag and crack. However, since there is no jarring or mechanical abuse such as is likely to occur to linings of tanks where the loads are lifted in and out by cranes, the average life of a lining in a continuous pickler may be longer than in the dip tank.

As already pointed out, one of the problems in the construction of continuous pickling machines is to find materials for the moving parts which will stand up under the severe action of the acids. The conveyor chains, the rails on which the chain rides, and the carrier hooks must often pass through plating baths, alkaline baths, and sometimes into tanks of lacquer and the drying ovens.

Production Line Pickling

More recent requirements in manufacturing call for the location of pickling tanks right in the middle of factory buildings and this means marked changes in design. Wholly or partially inclosed units are frequently used with quick opening covers and adequate exhaust systems. Floor space must be conserved and this frequently means the use of deeper tanks with its attendant problem of tank lining. Other features are the use of elaborate hoods on open tanks and the introduction of corrosion resisting alloys in the construction of continuous units. The Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., searched for more than two years before it found satisfactory alloys to use on its continuous pickling machines.

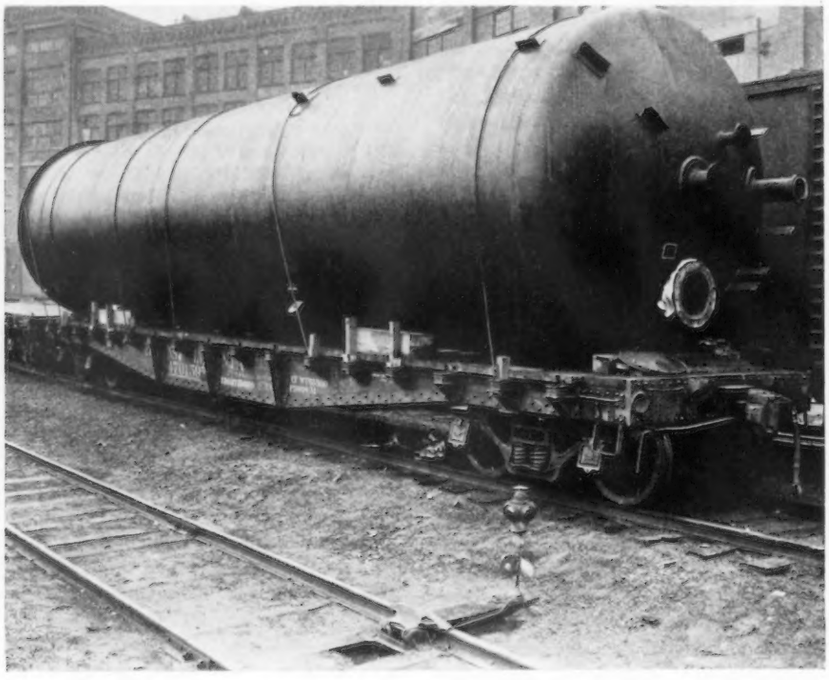
Continuous pickling of metal parts in the secondary fabricating field is one of the outstanding developments of the last few years. The design of the machines for this work has been taken from the previously perfected continuous plating machines, but within the last year or two modifications have been made and belt type continuous pickling machines are now coming into more common use. A further type of continuous machine where the material itself constitutes the conveying system is developing at the primary sources of material. Wire, strip, and sheets are now being pickled in continuous processes, the sequence often including other processes. The American Sheet & Tin Plate Co., for instance, has recently developed a process for rolling strip and heat treating and pickling it in one continuous operation. The rolling in this case is done on a 4-high Steckel mill built by E. W. Bliss Co.

The introduction of these new ideas in sheet and tin mills has led to a greater study of pickling operations, so that changes have been introduced in many mills. A number of modifications of the old fashioned tin mill pickling rack have been developed with increased efficiency. Further details in this connection will be given in a succeeding article in this series. The introduction of sheets of acid resisting alloys placed along the sides of tin mill racks to baffle the surge of pickle solution as the pickling machine rises and sinks, is said to raise the overall efficiency for the load by 2 or 3 per cent, a figure not to be scoffed at on a 100-ton day output for each machine.

New Economies in Pickling

As pickling took its place in the line of production processes, its previous inefficiencies became untenable and the importance of coordinating all direct-line operations became apparent. Acceptable and economical cleaning is obtainable only when the preceding heating and cooling practice has been properly adjusted, for such practice directly affects the time of descaling, the use of simply compounded solutions, the convenience and comfort in working pickles, the uniformity of action in removing the scales, the freedom from etching, frosting and pitting, and on top of all these, the cost. The methods of heating for forging and annealing must always enter into the plans for the pickling operation.

The thickness and tenacity of the scale depend, to a large extent, on how the scale is formed, that is, whether it is a forging scale, whether it is an ordinary heat scale, or whether it is what might be called a reheat scale, that is, a heat treat scale superimposed on a scale formed during hot forging. The type of quench affects the time required for



Pickling operations call for the storage of acids to provide ample reserve in metal working centers. This shows a rubber-lined acid storage tank.

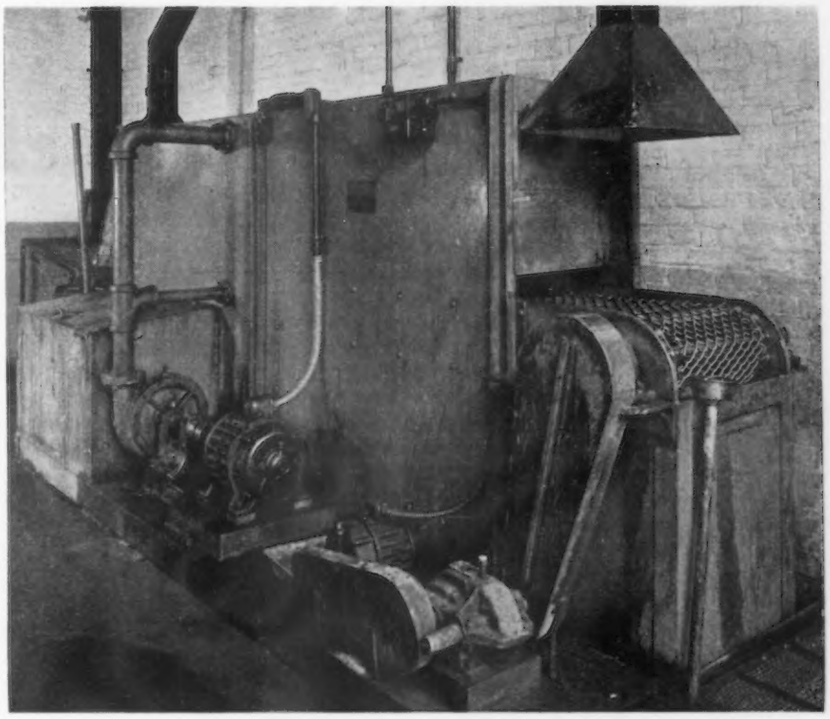
descaling, in two ways. First, when oil quenches are used, a degreasing treatment is necessary before descaling and this is usually and perhaps rightly charged to the cost of descaling. Second, oil quenching appears to increase the tenacity of the capillary bond which holds the scale to the base metal and thus lengthens the time required for descaling. These factors, in combination, have an unpredictable influence on the time required for descaling and consequently it is not possible to determine the cost of descaling by a mere inspection of the parts to be cleaned. Therefore, the time cycle should be determined by actually cleaning representative samples.

Acid Waste Is 1000 Per Cent

Some of the more usual forms of waste in pickling will be illustrated by an example from actual practice, which was considered average not long ago. The test case was the cleaning of 500 sq. ft. of steel on which 1000 sq. ft. of surface (both sides) were exposed to the action of the pickling acid. This was immersed 15 min. in a bath containing 2 gal. of sulphuric acid for every 100 gal. of water and heated to 200 deg. F. By this process 6 lb. of scale were removed. This was the purpose of the cleaning, but while removing these 6 lb. of scale, 65 lb. of metal were dissolved and 11 lb. of acid were required to do the useful work, while 120 lb. of acid were wasted dissolving the metal.

This case covers the more obvious direct inefficiencies. The other losses are more easily overlooked. If equipment is not properly designed, there will be handling losses, heat losses, and leakage. Leakage may be as high as 5 lb. of acid per ton of steel. A pair of tanks will handle, say, 100 tons of steel a day. If the tanks last only 500 working days and if acid can be bought at ½c. per lb., leakage at 5 lb. acid per ton of steel will cost $1,250 on a pair of tanks. This might be saved by spending only a small part for better equipment.

Breakdowns in pickling equipment are expensive. Pickling crews and foremen often must be paid for the idle time during repairs. If each man of a crew of ten men loses only 1 hr. per wk. at 50c. an hr. for 78 wks., the total is close to $400. The loss of acid is but part of the loss due to a leaky tank. Excess steam consumption is required to heat the extra amount of water and acid needed to maintain the level of a leaking tank. Shut-downs for emergency repairs while acid continues to attack steel mean poundage going into the sewer that should go into the shipping room.



Continuous pickling operations are possible on machines of conventional design in which acid resisting materials are used.

Good Equipment Pays

The difference in cost between a satisfactory tank lining and an unsatisfactory tank lining is often small. For instance, a new lining developed by the Goodrich Rubber Co., which involves a 3-layer principle, costs about $1.80 per sq. ft. for a 3/16 in. lining. Because of the relatively high price of acid resisting metals, thin gage metals are frequently used, and in this a simple principle of economics is overlooked. In one installation a monel metal sheet 0.025 in. thick was replaced by a similar sheet 0.062 in. thick, and by making this change the life was increased by nearly ten times although the increased cost was but 2½ times.

On most hoods it is found that corrosion starts from the outside rather than from the inside. This is because the condensed vapor from the acid bath keeps washing the inside and limits corrosion to the normal rate of the metal in the acid. On the outside, a coating of metallic salts and dust tends to accelerate corrosion. As a result it has been found good practice to provide for washing off the outside of ventilating hoods with a hose or other means. Also some special paints and greases have been developed for use on such hoods.

The extent of possible descaling economies may be judged from the experience of The Bullard Co. Two men are now required in place of 20 to 25 formerly employed for descaling on the same schedule of production. Grinding costs also have been reduced, with less than one-third the previous inventory of grinding wheels. Assembly costs are less, and the accuracy of manufacture has been improved. The plant manager says, "Our repair parts and replacement parts records show that the life of our machines in service has been lengthened noticeably since our adoption of a process for thorough descaling. We have found the new process to be materially less expensive than sandblasting, scratch brushing, or hand rubbing."

British Firm Sprays Wood with Metal

FOLLOWING extended laboratory research, a new British industry for coating wood with metallic tin has reached a production stage. The new product is especially applicable to furniture construction and household decoration. Several tin coated bedroom suites have already been completed.

The new process consists of spraying any metal, from tin to zinc or gold, in atomized form on to wood, fabric and plaster, making a surface that is an integral part of the material treated.

▲ ▲ ▲ Metallurgical

By T. W. LIPPERT

MORE precise information regarding precipitation hardening is transferring the attention of industrial metallurgists from tenths to hundredths and thousandths of a per cent of alloying elements, and even many binary alloys are now revealing unsuspected properties. Being therefore aware of the potent effects of gas inclusions and of minute proportions of element-metals and metalloids on the properties of "pure" metals and alloys, engineers are converting the laboratory high-vacuum induction furnace into a plant adjunct in order that special melts can be more closely controlled and standardized.

Another outstanding tendency of present-day metallurgy is to create a closer liaison with consumers so that specific alloys exactly suited to each problem of severe service may be evolved. Analyses, heat treatments, and rolling methods are being formulated with emphasis on the ultimate merits and suitable fabricating characteristics of the product. Now the plant metallurgist not only knows his own processes and products but is becoming equally familiar with the diverse requirements of consumer applications.

MORE powerful airplanes, fleet automobiles and sleek articulated railroad equipment, with power plants capable of rapid acceleration and deceleration, require machine parts capable of absorbing tremendous punishment without sacrifice of dependability and safety. In line with these exacting demands, plant and theoretical metallurgists not only have developed metals to meet the most rigid specifications of design engineers, but, in many cases during the past year, have anticipated machine and metal requirements. This year holds out promise of additional interesting developments, since the melter, steel treater and mill technician are becoming more fully aware of changing industrial and economic demands and are eager to embrace the varied opportunities which are currently being created.

The manufacturer no longer points with pride to massive and bulky products, but, on the contrary, has transferred his enthusiasm to the light, the trim, the well-designed product, the product that is resistant to corrosion, abrasion, impact and friction. Today, makers of alloys are not only concerned with the weldability, machinability and formability of metals, but are increasingly interested in artistic applications. More consideration is now given to methods of polishing, etching, and treating surfaces so as to add to decorative possibilities, in keeping with the growing demand for grace and beauty in fabrication and architecture.

The study of the possibilities of iron and steel production by direct processes steadily advanced during the past year. Recent improvements consist of two methods for direct production of wrought iron from highly concentrated ores. The successful laboratory tests are soon to be followed by commercial trials.

The Bureau of Mines reports success in the direct reduction of ferberite tungsten ores to produce satisfactory material for use in the manufacture of high-speed steel. It is hoped that this process will enable domestic ores to compete with foreign.

There were steady strides in the development of corrosion, abrasion, friction and acid-resisting materials. These developments, heretofore confined to chromium and nickel-chrome rust-resisting steels and iron, and anodized aluminum and aluminum alloys, expanded in various additional directions.

Work progressed on the important problem of preventing the precipitation of carbide from "austenitic" chrome-nickel steels during long exposure to high temperatures.

Reduction of grain size was made in several drawing steels without materially increasing the stiffness.

Many improvements were made in so-called ordinary low-carbon and medium grade steels, which expanded their possibilities in operations requiring deep drawing and severe cold forming processes.

In addition, the desirability of reducing the carbon content of stainless steels gave a decided impetus to the development of new ideas and designs in the construction of electric melting furnaces of the induction type.

Mills have also recently become more concerned with the proper heat treatment and selection of alloys for each specific consumer problem.

The die casting process became increasingly popular during the year because it provides adequate strength for many purposes with ease and cheapness of production and simplicity in forming to dimensions. There were also pertinent metallurgical improvements reported for the manufacture of compressed metal powder objects.

Advances in melting practice have made commercial gray irons available with tensile strengths up to 60,000 lb. per sq. in., and engineers are tending to desert more expensive materials to return to redesigned gray iron parts.

Iron and Steel

Despite the great attention now paid to alloy steels and irons, the study of "plain" steel and iron has suffered no appreciable setback.

The effect of preheating on the properties of common cast iron has been found to be so marked that many foundries are now heating melts to a temperature of about 1700 deg. C. before casting. The procedure produces more than a 25 per cent improvement in tensile and tranverse bending strengths, hardness and density. Several foundries are also now casting an improved silicon iron, especially suited for parts which must withstand abrasion and scouring actions while in contact with caustic liquids or vapors.

In connection with the properties of carbon steel, the general effect of sulphur and phosphorus is still somewhat controversial, but recent tests indicate that no detrimental effects are apparent in medium-carbon forging steel with sulphur up to 0.10 per

Achievements in 1933 Augur Well for Industrial Progress

cent, and low-carbon pipe steel with phosphorus varying from 0.007 to 0.08 per cent.

The causes of flakes in steel, according to an investigation made at the Breslau Technische Hochschule, are fine cracks. For their elimination, crystal segregation is to be avoided during solidification. Slow cooling will reduce flakes to a minimum, and, in many cases, flakes can be entirely eliminated by hot forging the cracks together.

Graded quenching and tempering of steel seem to be gaining favor as a method of obtaining desired tensile properties without going through the martensite step and incurring the danger of internal stresses, hardening cracks, and volume changes. This "interrupted hardening" treatment consists of cooling quite rapidly from a high temperature to a point below the transformation (austenite into ferrite and carbide), and holding steady at the lower temperature for about two hours. The stability of the austenite is roughly dependent upon the lower temperature.

Improvement in the properties of steel can be obtained by following the ancient practice of Japanese sword forgers in spreading a thin facing coat on blades before quenching, according to a recent work by S. Sato, which shows that such treatment results in a greater degree and uniformity of hardness. A mixture of 75 g. fire clay, 25 g. graphite, 30 g. tonoko, 14 g. anhydrous borax, and 200 g. water, is placed in a thin layer on thoroughly cleaned samples, after which they are carried through the usual quenching operations. An extension of this work may lead to improved hardening of industrial steels, minimization of surface and sub-surface cracks, avoidance of scaling, oxidation, and surface decarburization.

The status of magnetic hardening of steels continues to be somewhat in doubt. Despite the beneficial results claimed by Herbert (England), Wiester's (Germany) work indicates that diamagnetization and drawing of samples through a magnetic field at room temperature induce no measurable change in either their pendulum or Rockwell hardness. Magnetic treatment at elevated temperatures usually results in some improvement, but this change is usually ascribed to the heat treatment.

Improvements have been made in the electrographic, non-destructive, method of quickly and simply finding quantitatively the amounts of small elements present in steel samples. The method consists of applying on a cleaned portion of an unknown sample a filter paper soaked in a specific reagent on which there is then pressed an aluminum plate. A single dry cell is connected to the sample and plate so that the aluminum is the cathode. The flowing current carries metallic ions through the filter paper and it is specifically colored for each reagent-element combination. Experience in operation leads to good correlation between the amount of coloring and the percentage of each element present. The solutions recommended are: di-methyl-gloxime for nickel, potassium ferricyanide for zinc, sodium sulphide for cadium, di-phenyl-carboxide for chromium, and a solution of sulphacyanide of potassium and tin chloride for tungsten. The method is particularly adapted for segregation of suspected bars and scrap identification by semi-technical yard men.

Alloy Steels and Irons

Alloys are no longer made by somewhat haphazard additions of certain metals to a melt of steel. On the contrary, the variety of improved metals developed during the past year is a direct result of careful analyses and close supervision of melting and annealing technique. The more common alloying agents, in order of tonnages now produced, are copper, chromium, nickel, manganese, molybdenum and vanadium, each of which, either singly or in combination, confers specific properties on steel.

Two special steels for particular use in constructing pressure vessels were recently produced by the Polytechnisch Weekblad. The analyses are: first, 0.310 per cent C, 0.160 Si, 0.49 Mn, 0.050 S, 0.031 P, 2.62 Ni, 0.71 Cr, and 0.38 Mo, and, second, 0.280 C, 0.190 Si, 0.49 Mn, 0.032 S, 0.030 P, 3.32 Ni, 1.12 Cr and 0.47

THE advance of theoretical metallurgy the past year was especially pronounced in the field of precise physical measurements, with resulting detailed study of rather small sections of the general metallurgical field.

The physical chemistry of steel-making processes, originally developed in this country, progressed very rapidly, with the determination of the chemical constants of many reactions, especially deoxidation reactions.

In addition, corrosion, once nearly a hopeless scientific problem, is proving amenable to accurate physical measurements and statistical analyses.

Comprehensive work was done on a large number of binary and ternary constitutional diagrams, in which recently developed research tools, especially the X-rays, lent advantages previously lacking in work of this type.

R. F. MEHL

The age-hardening process was subjected to close analyses, and the various aspects of the process are now much better known.

Proper recognition of the importance of crystal structure in metal behavior was followed by a series of papers pointing out the importance of this factor in determining mechanical behavior, and the constitution and properties of alloys.

Robert F. Mehl, Director
Metals Research Laboratory
Carnegie Institute of Technology.

Mo. Recommended heat treatments are 80 min. at 850 deg. C. and 90 min. at 600 deg. C. for the first, and 90 min. at 820 deg. C. and 620 deg. C. for the second. Tensile strength is about 150,000 lb. per sq. in., elongation 20 per cent, and the vessel wall will easily withstand a service pressure of 75,000 lb. per sq. in.

Medium-manganese steels (0.20 C, 1.5 Mn) are more popular for cheap products demanding strengths midway between plain steel and chrome-nickel steel. The addition of 0.2 to 0.4 per cent molybdenum has been found to induce better deep hardening and permit quenching below the tempering heat, thereby improving the impact strength.

Alloy steels are finding increasing application in structural members. Molybdenum is favored as an alloying agent to reduce creep at high temperature, decrease temper brittleness, increase depth of hardening, contribute to resistance to wear, and allow machining at high hardness values. Additions of Mo have been found to improve the weather stability of Cu steels materially, and also to produce a structural steel or building material particularly well adapted to welding and riveting. A typical analysis is 0.8 per cent Mn, 0.4-0.7 Si, 0.25-0.6 Cu, up to 0.3 per cent Mo, and 0.20 per cent C for parts up to 4.5 in. thick, or 0.25 per cent C for parts exceeding 4.5 in. thickness.

Additional changes were made in foundry metallurgy and melting practice during the year. There are now over 75 different foundry steels available with tensile strengths ranging from 50,000 to 225,000 lb. per sq. in. Irons truly rust-proofed, as a parallel to non-rusting steels, are more in demand. Strengths are well in excess of gray iron and the corrosion-resisting properties come from comparatively high percentages of chromium and some nickel. Cast iron crankshafts are no longer experimental but have reached industrial fruition, and breakages are found to be less than in the steel counterpart because of the lessened effect of stress localization resulting from the multitude of graphite flakes. Analysis usually discloses about 3 to 4 per cent nickel and some Cr and Mo.

A new Ni-Cr cast iron is said to have extreme wear resistance. It is composed of a properly adjusted base mixture to which about 4.5 per cent Ni and about 1.5 per cent Cr are added in such balanced proportions as to give martensitic structure with a refined carbide network. Heat treatment is recommended for applications involving impact or alternating stress, and the fully hardened material is not machineable. The chilled surface will Brinell 150 numbers higher than chilled plain iron, and wear tests often indicate eight times longer life than chilled plain iron.

There is now increased emphasis on studies of non-rusting and heat-resisting cast irons. The Fe-Cr alloys with high carbon content are especially favored, inasmuch as they have all the desirable properties of cast iron combined with casting qualities superior to non-rusting steels. Two investigators have examined three alloys containing 34 per cent Cr, 1, 2 and 3 per cent carbon respectively, and constant silicon and manganese contents of about 1.3 and 0.4 per cent respectively. Tensile strengths ranged from 55,000 to 66,000 lb. per sq. in., and Brinell numbers varied from 250 to 350. The two alloys with lower carbon satisfactorily resisted hot and cold corrosive acids as well as various alkalis, and were also immune from oxidation up to 1100 deg. C. The alloys were easily weldable, but high-speed tools were required for machining. The general results found were that corrosion-resisting properties increased with Cr content up to 13 per cent, but resistance diminished with increasing carbon content. In order to increase the carbon content additional Cr must be added to replace the Cr removed as carbide from the solid solution.

One result of the extensive creep investigations was that Ni and Mn

THE theoretical metallurgist paves the way for the industrialist. The new atomistic metallography is attempting to correlate metal properties with the structural units—that is, the internal architecture—and thereby predetermine phenomena and inherent characteristics. No longer are X-rays, oscillographs, dilatometers, and magnetometers considered laboratory playthings, and the executive now realizes that darkfield microphotography, determination of Laue spot indices, and precision metallography are the very essence of metal development wherefrom the unusual alloy of today becomes commercially valuable tomorrow.

Industrial 200,000-volt X-ray units have made way for 300,000-volt installations, and units rated at 400,000 volts are in the immediate offing. Work at St. John X-Ray

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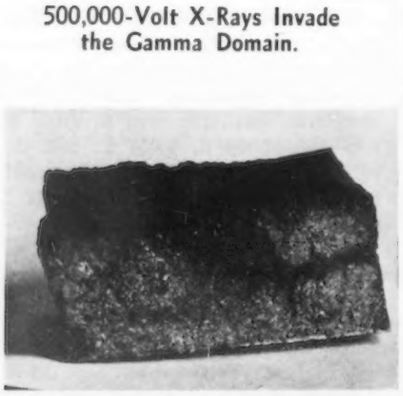
500,000-Volt X-Rays Invade the Gamma Domain.



Steadily increasing potentials for industrial X-ray units permit internal inspections hitherto reserved for gammagraphs. X-rays are controllable and have a narrow dominant wave length which produces sharp definition of cracks, whereas radon's broad wave band permits only a cursory examination. The exograph in the lower left clearly shows shrinkage cracks in a 6-in. steel casting, but the diffuse pattern of the gammagraph to the right only indicates general weakness because of cracks and gas pockets. The casting broken at the weak section is shown in the upper left view.

Service, Princeton University, and M.I.T. is rapidly advancing exograph technology and evolving practices soon to find commercial application. Work is progressing on an all-metal, efficient, and compact tube of extremely high potential, which may so simplify manipulation and reduce investment costs that plant installations of 500,000 volts or more will become common.

The early efforts of F. F. Lucas on the nature of martensite was a definite refutation of the charge that accurate microscopic work was merely a research tool. Using the precision, 4000-diameter magnification, metallographic apparatus of his own design, Dr. Lucas is now studying the size, number, and composition of the fine carbide particles in hardened steel. Several recent photomicrographs are shown below.

steels have lower impact resistance after exposure for 200 hr. at 840 deg. F. while stressed at 11,200 lb. per sq. in. Additions of 0.60 per cent molybdenum appeared to inhibit this embrittlement in Ni steels and was also partially effective in Mn steels. The impact resistance loss is found after cooling to room temperature, and the beneficial effect of Mo is only partially understood. The loss appears to be somewhat related to temperature or blue-heat brittleness.

* * *

Both German and American investigators made substantial advances in the metallurgy of tool steels. A carbon-free, precipitation-hardened, iron-cobalt-tungsten alloy was found in certain performance tests to surpass cobalt high-speed steels as much as 400 per cent. Precipitation-hardened, carbon-free tools are forgeable, do not decarburize during heat treatment, and may be machined to size after quenching and before aging, thereby avoiding oxidation and warping. Maximum hardness is secured with about 30 per cent cobalt and 15-20 per cent tungsten.

An interesting study (Comstock) has shown that additions (greater than 0.1 per cent) of titanium and chromium to common cast iron raise the transverse and tensile strengths as much as 20 per cent. Titanium supersedes the other alloying agents as a refining agent on the graphite flakes.

Because of an abundance of desirable characteristics, including a high corrosion resistance peculiar to copper and physical properties comparable to the steels, many non-ferrous metals were particularly favored during the past year. Extensive metallurgical activities resulted in many improvements of existing alloys and the development of several new metals primarily suited to specific consumer requirements.

A recent commercial application (Herculoy) contains approximately 94.75 per cent Cu, 3.25 Si, 1.5 Zn, and 0.5 Sn. Properties include a tensile strength of over 55,000 lb. per sq. in., and elongation up to 70 per cent in 2 in. A tensile strength of 100,000 lb. per sq. in. may be obtained by suitable cold working of the metal.

Because they are neither too hard nor too soft, the complex Ni-Cr alloys are in greater demand. These alloys are based on the Ni-Cr-Cu ternary with traces of other elements consisting of Mo, W, Fe, Mn, and Si. The metal has a specific gravity of 8.3, casting contraction of 5/16 in. per ft., machinability slightly harder than cast steel, and a Brinell of 170 to 200. The tensile strength is about 60,000 lb. per sq. in., elastic limit is 50,000 lb., and the melting point is close to 1300 deg. C.

Another alloy recently developed combines good casting properties with excellent corrosion-resisting qualities. It belongs to the Mg-Sn group, and has an analysis of 91 per cent Mg, 6 Sn, 1 Cd, 1 Zn, and 1 Mn. Proper heat treatment results in greatly improved physical properties. All of the Mg alloys are more popular because of the absence of crystal growth, excellent air hardening qualities, low weight, great resistance toward atmospheric corrosion, and relatively good strength at room temperature. Users of Zn-base die cast alloys are also using minute quantities of Mg to prevent warping and the tendency of the products to grow with age.

Foundrymen are turning to aluminum bronze as an admirable metal to fulfill many design requirements. A recent composition is 87-90 per cent Cu, 7-10.5 Al, 1-4 Fe, 0.2-0.5 Sn, and other elements up to 1 per cent. A tensile strength of about 65,000 lb. per sq. in. can be secured, and elongation of 15 to 20 per cent is characteristic. When heat treated the elongation is 4 per cent and the permanent-set stress 50,000 lb. per sq. in.

Many molybdenum alloys are now favored in industries other than the electrical. Many cutting and abrading tools now include molybdenum as an alternative to tungsten, and molybdenum-coated metal is supplanting tungsten tools in many processes. Also, a molybdenum alloy containing

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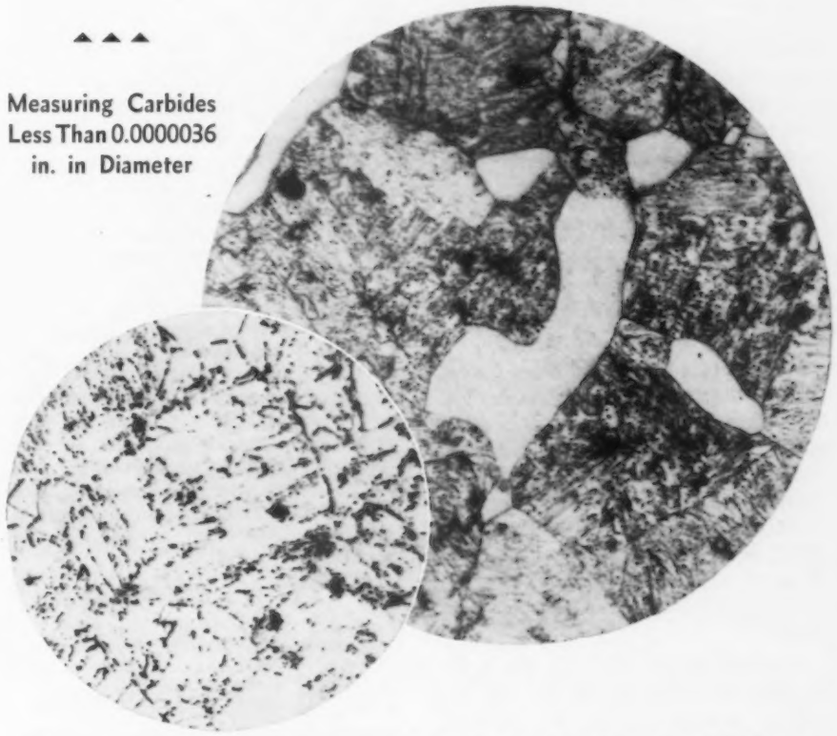
Measuring Carbides Less Than 0.0000036 in. in Diameter



Chrome-iron photographed at 4000 diameters with Bell Telephone's Zeiss-made new high-power metallographic apparatus. The lower sample, tempered at 1200 deg. F., has passed through the brittle range and possesses optimum physical properties; 61 per cent of the carbides are smaller than 9.2×10^{-6} cm. The upper sample is identical with the lower but tempered at 900 deg. F., thereby imparting poor physical characteristics. The carbides are as yet unmeasured, but large chrome ferrites are clearly resolved and easily discernible.

cobalt, tungsten, chromium and carbon is replacing diamonds in wire-drawing and bakelite-pressing operations.

Additional work has been done (Therkelsen) on nickel-tantalum alloys ranging in Ta content from 5 to 80 per cent and impurities less than 5 per cent. The alloys up to 35 per cent Ta are malleable and ductile, but with Ta content exceeding 35 per cent the metal is exceedingly hard and brittle. Strength and hardness increase with Ta content, and an excellent alloy with about 36-37 per cent Ta is theoretically possible. The corrosion resistance is generally very good especially in the region of 12.5 atomic per cent of Ta.

Aluminum-copper alloy foundries have been materially helped by a laboratory investigation of the effect of preheating on the metal's physical properties. The study showed that preheating above 750 deg. C. before casting is detrimental in many respects, and the usual treatment with zinc chloride does not remedy the condition. The results apply to alloys which contain both high grade or commercial grade aluminum.

Extensive experiments have been made at the Breslau Technische Hochschule concerning the formation of blisters during heat treatment of hardened aluminum alloys. It was definitely found that the trouble was deep seated and complex and is related to both the alloy constituents and surrounding media. The blistering is attributed mostly to the presence of hydrogen and constituents forming hydrogen compounds; sheets annealed in argon and high vacuum did not blister.

Bearing Metals

A number of new alloys suitable for bearings have been produced by experimenters both here and on the Continent.

An improved bearing bronze uses 0.4 per cent S and 1.5 per cent of a silicon-zirconium alloy as a dispersing agent instead of tin or antimony as is the general procedure. The bronze contains up to 45 per cent of lead, and possesses wear resistance and compression strength equal to or superior to most commercial alloys. The impact strength, however, is somewhat lower.

Another excellent bronze has a Pb content up to 50 per cent, whereby the excess Pb displaces Cu. This alloy is particularly suited for bearings carrying high-speed shafts. The Pb improves castability, densifies structure, and improves the working characteristics (by hammering or filing) of the metal. For the molds, green sand is preferable, and Pb segregation can be restricted by small additions of Ni. A typical analysis is 5 per cent Sn, 30 Pb, 1 Ni, and 64 Cu.

Two German workers performed a particularly valuable service by correlating temperature with the mechanical properties of a number of alloys. Temperatures varied from 20 to 200 deg. C., and the properties investigated included resistance to wear, to impact (Izod), to pounding (repeated impact), compression strength, and Brinell hardness. The ten alloys tested were two Sn-base (84-91 per cent Sn, 8-5 Sb, 8-5 Cu), seven Pb-base (62-96 per cent Pb, 20-0 Sn, 15-0 Sb), and one Cd-Zn (82-18) alloy. In general the Sn-base metals showed lower wear-rate at 20 deg., and in most cases had higher single-blow impact resistance between 20 and 200 deg. C. than Pb-base and the Cd-Zn alloys. Most Pb-Sn-Sb alloys had superior mechanical properties as the content was increased. Cd-Zn alloys had higher hardness, greater resistance to deformation under pounding, and better compression properties at temperatures up to 200 deg. C. than the Sn-base and Pb-Sb alloys.

Canadian Iron and Steel Output In 1933 Showed Gain Over 1932

TORONTO, Jan. 2.—The Canadian iron and steel industry in 1933 showed considerable improvement over the preceding 12 months, although production was well below the average of the last 20 years. Dominion steel ingot output last year amounted to 392,000 gross tons, as compared with 312,360 tons in 1932, a gain of more than 25 per cent. The peak production of 1929 was 1,309,543 tons. Pig iron production registered an even larger increase rising from 144,130 gross tons in 1932 to 212,667 tons last year, a gain of 48 per cent, but comparing with a 1929 output of 1,099,244 tons.

From the middle of February until the latter part of June there was a pronounced slump in operations by the various branches of the steel industry, but the last half of the year brought a spurt that brought the favorable improvement over that of 1932.

Demand for pig iron in turn was dull with melters adhering almost entirely to hand-to-mouth buying. Sales mostly were in single carlots and averaged between 400 and 500 tons per week. In the middle of the year producers dropped prices $1.50 per ton, with the expectation that such action might stimulate business. Direct results from this move, however, were negligible and sales continued small.

In the first half of the year steel mills maintained an operating rate of between 10 and 15 per cent of capacity. The placing of large rail contracts by the Canadian National, and awards from the South African government in July, brought a more favorable turn to the industry.

Increased mining activities in all parts of Canada were largely responsible for improvement in many branches of the iron and steel industry. From this source came numerous orders for mining and milling equipment, machinery and tools of various kinds. The automotive industry also played a leading part in the industrial upswing. Production and sales of motor cars and trucks reached the highest level in two or three years, with the result that car manufacturers were consistent buyers of other lines of steel products.

The building trades were practically at a standstill throughout the year, with only a small number of large tonnage projects reported. Structural steel fabricators had only small jobs and their operations were at a minimum. Towards the close of the year there was some revival in construction work, mostly in small factories and dwellings, which gave a brighter outlook to the trade.

The following table shows comparative figures of iron and steel production from 1923 to 1933 inclusive in gross tons:

	Pig Iron	Steel Ingots	Steel Castings	Ferroalloys
1923	880,018	839,710	45,060	29,961
1924	593,024	625,175	25,515	26,400
1925	570,397	733,855	18,840	25,709
1926	737,503	745,550	33,338	57,416
1927	707,697	867,928	39,710	56,330
1928	1,037,727	1,190,001	44,718	44,882
1929	1,099,244	1,309,543	70,145	80,010
1930	747,178	957,430	54,313	65,223
1931	420,038	664,826	37,055	46,764
1932	144,130	312,360	22,915	15,487
(a) 1933	212,667	391,994	15,535	23,740

(a) December production figures estimated.

Progress in the Foundry in 1933

By H. M. LANE
Consulting Engineer, Grosse Ile, Mich.

THE trend of events during the past year has been against the development of new foundry equipment or anything that required capital investment. On the other hand, there has been considerable progress in metallurgy. A limited number of individual firms have improved their own plant arrangement and handling equipment, but little new equipment has been purchased. In the matter of molding machines there is little to report, though one prominent firm announces that it will soon have an entirely new machine on the market.

Quick-Annealing Malleable Iron

A year or two ago we commented on the development of high-test gray iron, brought about primarily by the use of the electric furnace and also by the recognition of the fact that the initial temperature played an important part in the final structure of the metal. The past year has seen the practice carried on, but the principal contribution has been in what is generally known as quick-anneal malleable iron. Recently a number of large manufacturers have included this material in the standard specifications when calling for bids.

The quick-anneal malleable product makes possible the obtaining of a high-strength ductile casting in a much shorter time than the old standard malleable process afforded. The two accompanying photomicrographs show the structure of this material, Fig. 1 being as cast, and Fig. 2 in the annealed form. It will be noted that the material is of great uniformity in structure. The chemical composition is as follows: Silicon, 1.50 per cent; total carbon, 2.40; manganese, 0.35 to 0.40; sulphur, not over 0.03; phosphorus, from 0.03 to 0.04; chromium not over 0.035. Sometimes molybdenum is added and has the effect of considerably increasing the strength, but the disadvantage of increasing the annealing time.

In the steel casting field, we find the tendency everywhere to turn to alloyed material and to supplying high-grade material for special uses. Plants turning out relatively small castings have in many cases concentrated on the stainless steel group, which is high in chromium and nickel. Sometimes molybdenum is added.

Fig. 1—Grain structure, at 100 magnifications, of quick-anneal malleable iron in the as cast condition.

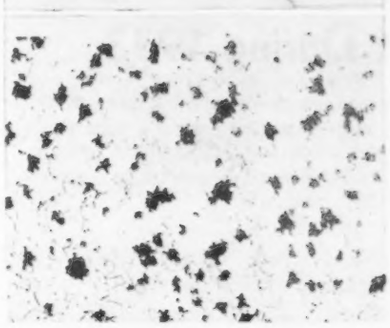


Fig. 2—Quick-anneal malleable iron in the annealed condition, 100 magnifications.

It has become more and more apparent that these new types of steel to be at their best cannot be made by any slap-dash method. First, there must be exceedingly careful metallurgical control of the composition, and second, the material must be properly heat-treated.

Coupling Stainless Steel Tubes

We have long had available tubing, sheets and special shapes of what is commonly known as 18 and 8 (18 per cent chromium and 8 per cent nickel). This material has been extensively used in chemical plants, in the dairy industry and in the handling of corrosive liquids. One of the principal difficulties in the past has been the suitable joining of such tubes. The Michigan Steel Casting Co., Detroit, has brought out a line of fittings for this purpose. Where screwed fittings are used, the tubing must be of sufficient thickness to allow for proper threading, and this increase in thickness greatly increases the cost when using the expensive alloys. The joint developed by the Michigan company is a clamping device or coupling, which is shown in Figs. 3 and 4. The inner sleeve in all cases is made of the same composition as the tubing. It will be noted that the ends of the sleeve are parallel to fit the inner diameter of the tube. The tube ends are expanded by special device and clamping flanges hold the tube to the inner shell. Where a corrosive material reaches the inside of the tube only, the clamps and bolts may be of standard steel construction. Where the corrosive material is on the outside, the entire device must be made of special alloy material.

Other means of coupling the tubes have been brought out, including special devices for quickly coupling or uncoupling the joints where it is necessary to resort to mechanical means for cleaning the inside of the tubing.

Incidentally, we may mention one development in the Michigan Steel Casting Co.'s plant. To lengthen the life of the roof on the electric furnaces, a water-cooled system was introduced to support the roof. This consists of a series of cast bars of soft steel through which water is circulated. They were expected to increase the electrical input per ton of finished product, but this has not been the case, owing to the fact that the radiation from the refractory material in the roof is greatly reduced.

Steel foundries catering to heavier work have, in many cases, confined their efforts more to the inexpensive corrosion-resisting alloys or heat-resisting alloys. In the former, we have copper-bearing steel.

The steel foundry more and more

Fig. 3—Assembled compression fitting for joining stainless steel tubing.

finds it necessary to study its customers' problems and to show what savings can be made by using better material. One interesting application with the die industry may be cited. A large wheel maker now has die blocks made from a chromium-molybdenum mixture for the cold-pressing of steel wheels. These dies have turned out over 200,000 wheels and are still in good condition. The maker of the dies, the Detroit Steel Castings Co., reports that while the proper alloy is of importance, the heat treatment is even more so.

Revival of Oil and Gas-Fired Furnaces

Five or six years ago the trend in heat-treating furnaces was largely toward heating by electricity, but the electric power companies are so hedged about with rate control that it has been impossible to make special rates for these large and desirable loads. This has enabled the gas and oil people to come back into the field with oil-fired or gas-fired furnaces and most of the late installations come under this class.

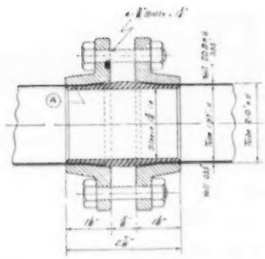


Fig. 4—Cross-section of the fitting for coupling lengths of stainless steel tubing.

Substantial Developments in Drilling and Boring Equipment During 1933

IN addition to the grinding, broaching and other new machine tools in the review by R. E. Miller in the last issue, page 119, there were a number of substantial developments during 1933 in machines for drilling and boring. These were mainly of hydraulic type and included several interesting specially-arranged high-production units for automotive plant use.

A NEW hydraulic ram-feed drilling machine features application of hydraulic pressure directly over the center of the cutting tool, giving a "tremorless" feed action even when driving 2-in. drills in solid steel. The hydraulic cylinder, large diameter ram, and spindle comprise an individual unit that eliminates the need of a long saddle on the column ways. The automatic hydraulic feed cycle provides rapid approach, feed, dwell and rapid return. Feeds range from 0 to 30 in. per min., and speeds from 34 to 936 r.p.m. Auxiliary multiple spindle heads can be applied and the machine can be adapted easily for boring operations.

For deep drilling of small, deep holes, another company developed a new hydraulically fed step-drilling machine. The drills advance to the work at high speed, then change automatically to fine feed, and after drilling to a predetermined depth, they completely withdraw from the work, return again at high speed and then go into feed. After the holes have been drilled to full depth, the spindle slide returns to its highest position and stops. Two or more units can be mounted on one base for drilling holes up to ¼ in. in diameter, 8 in. deep. Spindle speeds from 750 to 3000 r.p.m. are obtainable.

Speeds up to 1700 r.p.m. Obtainable

Automatically oiled, anti-friction drilling, boring, reaming and tapping machines with spindle speeds up to 1700 r.p.m., which adapts them for use of cemented carbide tools, were offered in six sizes. Convenient control is a feature, the controls being designed and located so that the operator can grasp them naturally without taking his attention from the work. Lubrication is automatic; all gears and bearings are inclosed and receive a continuous supply of filtered oil under pressure. The head of these machines is of unit design and can be arranged in gang style with from two to six spindles. A number of heads can be built into special machines for multiple-spindle, single-purpose operation.

Self-contained hydraulic units designed to be arranged in groups to drill all holes in the various sides of a piece at one handling were brought out by a prominent builder of drilling machines. These units are interchangeable and are very flexible. Should the part for which the units are arranged be altered or discontinued, it would only be necessary to rearrange the units and equip them with different drill heads to adapt the machine to an entirely different piece of work. The units are made in sizes to take motors from 5 to 20 hp.

Special Drilling Machines Give High Production

Special drilling machines made up of several drill units arranged for particular jobs included one having six hydraulically-fed drill heads for drilling all the oil holes in a forged automobile crankshaft. Operation is semi-automatic, all drill heads being completely controlled by one foot pedal. A valve and trip mechanism permits step drilling of the deep holes. A four-position trunnion-type fixture holds one crankshaft in each position, and is indexed to carry the crankshafts successively to the various drill heads.

Another special machine drills and reams V-type automobile cylinder blocks to receive a main bearing oil tube, and assembles this tube. A conveyor brings the cylinder block to the machine and the work is then carried successively to six stations, at the last of which an oil tube, taken automatically from a magazine, is pressed into place. All operations are performed hydraulically and no mechanism can function until the preceding step has been completed. The ma-

(Concluded on Page 51)

Steel Capacity Expands Little in 1933

THE steel industry completed only four open-hearth furnaces in 1933 and the resulting expansion of capacity — 339,000 tons — was the smallest with the exception of 1932 since 1922.

In 1932 only 100,000 gross tons was added to open-hearth capacity, the smallest increase in a long period. The next smallest addition to capacity was 227,500 tons in 1922, following the 1921 depression. By way of contrast, the year 1931 saw an expansion of 4,075,000 tons in capacity, the result of an extensive program inaugurated in 1929.

The open-hearth furnaces completed in 1933 included the following: two 150-ton furnaces for the Great Lakes Steel Corpn., Detroit, having an annual capacity of 264,000 tons; one 60-ton furnace for the Granite City Steel Co., Granite City, Ill., having a yearly capacity of 50,000 tons; and one 30-ton furnace for the American Steel Foundries at Granite City, having an annual capacity of 25,000 tons.

As in 1932, blast furnace expansion was at a standstill last year. One company erected a new furnace to replace an old one, and another company relined and enlarged one of its stacks. Unless a new furnace is built on a new foundation, it is not regarded as an expansion of capacity. The last major addition was a new 600-ton stack built in 1930. Besides the year 1933, there were four other post-war years when no new blast furnaces were added—1923, 1927, 1931 and 1932. Years in which only one stack was added to capacity were 1921, 1924, 1925, 1929 and 1930. Two new furnaces were built in 1919, 1922, and 1928. The largest post-war expansion years were 1920 and 1926 in each of which six new furnaces were built having a capacity of 875,000 and 1,225,000 tons respectively.

A factor limiting future expansion in open-hearth steel ingot and blast furnace capacity is the fact that the code of fair competition under which the industry is now operating prohibits new additions of this nature without Presidential sanction.

Additions to electric melting were made last year by several companies but the information is not complete. At least five furnaces were listed for installation this and last year. One is a 25-ton unit.

An interesting feature is the installation by several large steel companies of heat-treating equipment for various purposes.

In the following paragraphs are contained the main features of additions to equipment for this and last year as reported to THE IRON AGE:

Reports of Various Companies

United States Steel Corpn.

New construction completed during 1933 and under way as of Jan. 1, 1934, by subsidiary manufacturing companies is as follows:

CARNEGIE STEEL CO.

Completed

Ohio Works: Metallurgical laboratory building and equipment.

ILLINOIS STEEL CO.

Completed

South Works: Additions to 96-in. continuous plate mill.

NATIONAL TUBE CO.

Completed

Ellwood Works: Reconverting No. 8 seamless mill for economic production of o. d. tubing with range from 2 in. to 4½ in.

Lorain Works: Extending facilities for production of billets and slabs at No. 1 blooming mill and 32-in. bar mill.

OIL WELL SUPPLY CO.

Completed

Imperial Works: Continuous heat-treating furnace.

AMERICAN STEEL & WIRE CO.

Completed

Installation of equipment at Cuyahoga and Newburgh Wire Works in the Cleveland district for use of purchased electric power.

AMERICAN SHEET & TIN PLATE CO.

Completed

Gary Tin Works: Four-high reversing cold reduction mill No. 2 and auxiliary equipment.

Converting 4-high cold reduction mill No. 1 to reversing type and improving continuous annealing, cleaning and shearing equipment.

Gary Sheet Works: Modernizing hot mill department, including continuous heating furnaces with mechanical handling equipment, and 3-high finishing hot mill.

Vandergrift Works: Modernizing hot mill department, including continuous heating furnaces with mechanical handling equipment, and 3-high finishing hot mill.

Under Way

Gary Sheet Works: Two 4-high reversing cold reduction mills, tempering pass cold mill and auxiliary finishing and shearing facilities.

TENNESSEE COAL, IRON & RAILROAD CO.

Completed

Fairfield Works: Extension of sheet mills, and normalizing furnace at sheet mills.

Bethlehem Steel Corpn.

Subsidiary companies report the following principal improvements and additions completed in 1933 and under way at the close of the year:

BETHLEHEM STEEL CO.

Completed

Bethlehem Plant: Heating furnace for forge department.

Lackawanna Plant: Two fuel oil tanks and piping; additional transfers for hot bed; two gas producers and two roller levelers for sheet mills.

Maryland Plant: Two continuous heating furnaces and a 3-high roughing mill with automatic tables for sheet mills; two primary coolers for coke oven by-product department.

Under Way

Cambria Plant: Cleaning house and equipment for rod and wire department.

Maryland Plant: New turbo-blower for blast furnaces, new blast furnace "D" replacing former "D" furnace; gas cleaning and distributing system for blast furnace gas; three gas disintegrators, moisture eliminator and mains for clean blast furnace gas; installing 8-in. bar mill including necessary buildings and equipment.

PACIFIC COAST STEEL CORPN.

Under Way

Seattle Plant: Warehouse.

MCCLINTIC-MARSHALL CORPN.

San Francisco Works: New structural fabricating shop of 18,000 net tons annual

Additions to Open-Hearth Capacity Since the War

Year	Annual Capacity, Gross Tons	Year	Annual Capacity, Gross Tons
1919	625,000	1927	630,000
1920	675,000	1928	895,000
1921	247,500	1929	1,005,000
1922	227,500	1930	845,000
1923	875,000	1931	4,075,000
1924	375,000	1932	100,000
1925	585,000	1933	339,000
1926	865,000		

capacity at Alameda, replacing the shop previously operated in San Francisco.

Youngstown Sheet & Tube Co.

The Youngstown Sheet & Tube Co., Youngstown, Ohio, completed during the year 1933, at its various plants, the following construction work:

CAMPBELL WORKS

Sheet Mill: A 3-high roughing mill, with catcher and feeder tables was installed in No. 1 sheet mill; a continuous re-squaring shear and slitting shear unit was installed.

STRUTHERS WORKS

Conduit Plant: Rebuilt the rigid conduit plant, which included new building, rearrangement of existing equipment and the addition of some new equipment.

Rod and Wire: Installed a wire patenting furnace, one new drawing machine, and made changes in galvanizing department for 4-minute wire.

INDIANA HARBOR WORKS

Coke Plant: Installed one crusher, two screens and auxiliary equipment for handling domestic coke. A mixing station with equipment and pipe was installed for handling refinery gas.

Bar Mill: Morgoil bearings were applied to four stands on the 21-in. mill.

Skelp Mill: Two new pilers for the cooling bed on the 10-in. mill.

Tin Mills: One continuous pair furnace, one continuous pack furnace, and a set of automatic feeding and catching tables installed on the finishing stand in front of the pair furnace. This equipment plus other auxiliary handling equipment installed necessitated an extension to the original buildings.

General: Equipment was installed and changes made in the open-hearth, slab, billet and merchant mills for the manufacture of alloy steel. Changes made to several furnaces for the burning of still gas.

Republic Steel Corpn.

New equipment, which has been installed by the Republic Steel Corpn. during the past year, is as follows:

Youngstown District:

Provisions were made for the manufacture of Grade "C" casing and also for upsetting oil country tubing.

Additions to 10-in. skelp mill were made to provide for the production of coiled skelp.

No. 2 blast furnace was relined and enlarged and an electric gas precipitator added.

Warren District:

Provisions were made for the manufacture and treating of electric strip and sheets.

A new 4-high reversing cold mill for cold-rolling hot-rolled strip down to tin plate gages was constructed.

Central Alloy District:

A 12-in. bar mill was reconstructed in order to roll heavier and wider sections.

A 25-ton electric furnace was completed and put into operation in order to increase the electric furnace steel capacity.

Additional furnaces were installed in the heat-treating department.

Culvert Department:

Provisions were made to provide for the manufacture of multi-plate culverts of large sizes.

A culvert plant was installed at Danville, Ill.

Buffalo District:

Provisions and extensions were made in the die roll department to provide for the manufacture of a greater tonnage of this product, also to take care of longer and heavier unit sections.

Blast Furnace No. 1 has been relined and enlarged.

Chicago District:

Alterations were made to provide for triple stranding in the 10-in. rod mill.

An electric heat-treat furnace for bars and forging billets has been installed.

Facilities for manufacturing railroad spikes have been added.

Facilities for the production of tacks from coiled strip have been added.

Furnace installations were made in order to produce patented spring wire.

Provisions were made at the Moline plant for the manufacture of improved design steel fence posts.

Upson Nut Division:

Installations were made to increase heat-treating and hardening facilities.

Union Drawn Steel Co.:

Extensive improvements were made to the Massillon plant on account of its close proximity to the manufacture of carbon and alloy bars, which, in turn, assures more prompt service to customers.

Grinding equipment was installed to permit precision grinding of flat cold-drawn steel products.

Magnetic testing equipment has been installed at both Massillon and Gary plants.

Steel & Tubes, Inc.:

Extensive additions and improvements have been made at the Cleveland plant to provide for the manufacture of all sizes and grades of electric welded boiler tubing.

Berger Mfg. Co.:

Provisions have been made for the production of highway guard rails.

Other Companies

During the past year the Carpenter Steel Co., Reading, Pa., made the following major additions to its equipment:

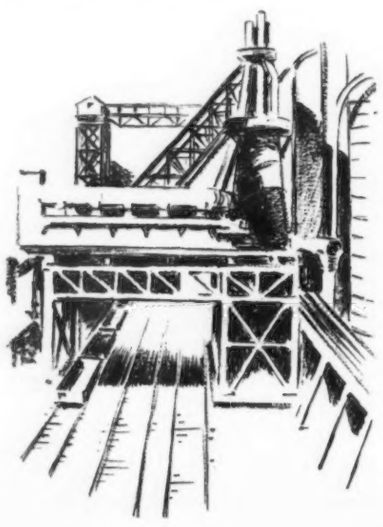
Westinghouse bell-type, bright-annealing electric furnaces for annealing of flat and round steel in coils, equipped with four stools and two heating elements.

Installation of 1500-lb. Nazel air hammer.

Erection of one polishing machine for the polishing of flat steel. This machine equipped with 16 spindles.

Two coal furnaces were rebuilt and equipped for oil firing.

One 4-high United Engineering Co. 5 in. x 16 in. x 12 in. cold rolling mill equipped with 100-hp. Westinghouse drive.



The Inland Steel Co., Chicago, was licensed last year by the Cold Metal Process Co., Youngstown, to install and operate a wide Steckel mill for producing corrosion-resisting, special alloy and high-carbon strip steel. Supplementing the new strip mill, the Inland company completed last fall a new tin mill with an annual capacity of about 250,000 tons. This mill was furnished by the Mesta Machine Co., Pittsburgh.

* * *

The Firth-Sterling Steel Co., McKeesport, Pa., completed in 1933 a new brick building on the company's property at Demmler, Pa., closely adjoining the tool steel plant, for the use of the Globe Wire division of the company. The old Globe Wire plant in Sharpsburg, Pa., is now completely shut down and no further manufacturing will be done there. The company's new wire and drill rod plant is now in full operation.

* * *

The Globe Steel Tubes Co., Milwaukee, is now installing a Foren continuous-type tube mill of 21 stands, individual drives, for the manufacture of tubes up to 4 in. outside diameter. This mill is equipped with 21 variable-speed motors of varying horsepower and a 1500-kw. generator set.

* * *

The Jones & Laughlin Steel Corpn., Pittsburgh, has the following projects of major importance under way:

At its Aliquippa Works there is now under construction one 4-high cold rolling mill and, at its South Side rolling mills, equipment is being installed to standardize piling sections.

* * *

The Universal Steel Co., Bridgeville, Pa., made last year the following additions to its mill capacity:

One additional finishing unit to hot roll strips up to 24 in. width.

One 20-in. Steckel cold rolling mill.

* * *

The Wheeling Steel Corpn., Wheeling, W. Va., will install this year at its Yorkville Works a continuous cold strip mill for the production of black plate suitable for tinning. Its estimated capacity will be about 7500 tons per month. It will be furnished by the Mesta Machine Co.

* * *

The Eastern Rolling Mill Co., Baltimore, Md., manufacturer of sheet steel, is installing a 4-high 16-in., and 44-in. by 84-in. cold mill which will be ready for operation in February.

* * *

The Central Iron & Steel Co., Harrisburg, Pa., made last year some improvements in its flanging department, including the installation of a 10-ton electric traveling crane.

New Electric Melting Capacity

Several companies report the installation of electric melting furnaces.

The Globe Iron Co., Jackson, Ohio, plans to put into operation during 1934 a 3-ton Heroult furnace for making high-silicon special irons.

The Ludlum Steel Co., Watervliet, N. Y., installed last January a 4-ton Ludlum furnace.

The Rotary Electric Steel Co., Detroit, erected a new plant at 20781 Pinewood Avenue, consisting of a main mill building, 72 by 1200 ft., of structural steel, and a two-story office building, 45 ft. square, of brick and concrete. The company produces billets and bars by a centrifugal process. Details as to the electric melting equipment are lacking, though it is stated that a Heroult furnace has been installed. Rotary furnaces, casting machines and special electric equipment were furnished by the Westinghouse Electric & Mfg. Co., East Pittsburgh.

A 3-ton Lectromelt furnace was sold last year to the United States Navy Yard, Norfolk, Va., by the Pittsburgh Lectromelt Corpn., Pittsburgh.

Current Opinion in the Metal-Working Industry

BELOW is a continuation of the comments received in connection with the Survey of the Industry which was published in THE IRON AGE of Jan. 4. These expressions of opinion were so numerous as to make it impossible to complete them in the previous issue and so interesting that it was decided to continue them in this number. They reflect the thoughts, fears and hopes of a typical cross section of the varied metal-working industry as related to present conditions and the immediate outlook.

Finds Cut-Throat Competition

Prices started to stiffen in June and July but since NRA has neglected everything but wages, cut-throat competition is now very strong.

From a manufacturer of springs of all types.

* * *

Uncertainties Retard Expansion

Uncertainties introduced into business by administration at Washington retarding healthy normal business expansion.

Because companies like ours have no organized powerful voice to champion our cause, we are helpless while money is being taken from our pockets and put into those of the organized minorities.

From a manufacturer of semi-finished nuts, screw machine products.

* * *

Less Emphasis on Price

Buyers are putting less emphasis on price; more consideration given to quality, design, and service.

From a manufacturer of roller bearings and roller bearing units.

* * *

Banking Credit? Try and Get It!

In my judgment the banking situation is the most serious at present. Small manufacturing concerns like ourselves need outside banking credit at times. Try and get it!

From a manufacturer of automobile body maintenance parts.

* * *

Finds Buyers Hesitant

Unsettled political situation, monetary matters, and uncertainty of NRA program combine to cause hesitation on the part of our buyers. Inquiries have been good, but projects are held up, and it is difficult to secure orders on quotations.

From a manufacturer of metal working drilling machines

Readjust Values to Aid Farmer

The story of the condition of the agricultural classes, their reduced purchasing power, their reactionary attitude toward things in general, and the hardships they have suffered, need little comment. We must at the earliest possible moment bring about a readjustment of values and the new establishment of purchasing inclination as well as purchasing ability. Stabilization of the financial structure of the country, is in our opinion, most important right now.

From a manufacturer of farm equipment, hand tools, etc.

* * *

"Temporary and Illusory"

I am opposed to the principles of the NRA. I feel their "advantages" are temporary and illusory.

From a manufacturer of agricultural tools.

* * *

Suggests Bisecting CWA Labor Rate

Think CWA relief rate for common labor too high. If projects are worthy and properly in need of labor and what it brings, suggest splitting rate and doubling number employed—hence doubling results and forestalling competition with legitimate industry.

From a manufacturer of agricultural tools.

* * *

Suggests Long Term Loans to Industry

We feel that the greatest possible good would result from providing industry with funds in the form of long time loans at a very low rate of interest. These loans to be made on company's notes which were formerly good at the banks. Under existing arrangements a firm is required to mortgage all assets to secure a small loan, thus causing open account creditors thereafter to feel their security is questionable, which destroys the firm's credit.

From a general jobbing founder and machinist.

Small Units in Iron Industry Suffer from Basing Point Charges

Smaller units in the iron industry that are located at points other than "base" are at a serious disadvantage to paying freight charges that are unearned by the steel manufacturer. Johnstown, Pa., and Youngstown, Ohio, are marked examples.

From a gray iron foundry, and mine equipment manufacturer.

* * *

Stagnation Due to the Dollar

I believe that the present state of total stagnation in our line is not so much the NRA as due to the fluctuating value of the dollar and the uncertainty of the experimenters at Washington. There is plenty of good business, just waiting and hesitating. The uncertainty makes new capital investments very cagey and shy.

From a machinery dealer.

* * *

Lack of Confidence and Unsettled Money

Lack of confidence in what outcome will be of this unusual procedure of our Government and unsettled value of our money causes all industry to hold back and buy only hand to mouth, not taking any chances on the future.

From a manufacturer of railroad refrigerator car parts, etc.

* * *

NRA Does No Good

We do not depend on NRA as it does not do an good in our firm.

From a manufacturer of mining equipment.

* * *

NRA Fundamentally Sound

We believe NRA to be fundamentally sound—not perfect—but that we should all boost, not knock, unless we have something really constructive to offer. Believe your magazine a bit too antagonistic to NRA.

From a manufacturer of gears and gear forgings for the automotive and tractor industry.

* * *

Buyers Will Not Accept Increased Prices

Customers are not willing to admit that increases in prices are justifiable and are willing to buy at the old prices.

From a manufacturer of industrial ovens and dryers

* * *

Signing Code Because "We Have To"

We are this week putting our name on the code because we have to. Government orders would be withheld from us and they threatened to put over a worse code on us. This code business is not a free bill signing in form of the word.

Unidentified.

* * *

Wants Partnership of Government and Business

NRA will succeed only if proper partnership is maintained between Government and business—Government to set hours and wages only, each branch of industry to police itself.

From a manufacturer of steel fabrications.

* * *

Suggests NRA Disappear

As soon as NRA disappears we will get better business conditions.

From a manufacturer of foundry equipment.

* * *

Unevenness Traced to Government in Business

We have experienced an unparalleled unevenness in business. There was a little spurt in July and August, but we think it was due to stocks being low and buyers believing there would be an advance in price. September, October, November have been very uneven, the buying being principally actual needs for replacement. There seems to be a feeling of uncertainty which is holding up business. We believe there is a general feeling prevailing that there is too much Government in business with a result that investment is being held up.

From a manufacturer of pumps, air compressors, and condensers.

* * *

Chiseling Is Rampant

Code in this industry has not yet been ratified. More chiseling than ever before, especially through offering of very irregular terms of settlement and acceptance of unnecessary trial orders.

From a manufacturer of bakers' equipment, water softeners, special food machinery.

* * *

Heartily in Favor of NRA

On a whole we are heartily in favor of the NRA and are cooperating to the fullest extent possible.

From a manufacturer of gears.

* * *

Stand Back of the President

Stand behind President Roosevelt. Do not try to hinder his policies until we know they are bad, or at least until we know what they are. The political "outs" want to get in. If the President's policies fail these "outs" have a

better chance of getting in. Recently the St. Louis Chamber of Commerce petitioned the President to restore the gold standard and there isn't a man in the whole outfit who knows what that petition means; the object of the petition being to harass the President.

From a manufacturer of steel shelving, lockers, office cabinets.

* * *

Urges Press Support President

We believe that the President (in a general way) has a program that will benefit society at large if given the proper support by the daily press and trade publications.

From a manufacturer of grain handling machinery for farm use.

* * *

Fear Collective Bargaining Clause

We believe the labor clause of collective bargaining will be a serious handicap in conducting our business. While we are not dominated by organized labor we are positive we will be in the very near future, and are expecting plenty of grief.

Unidentified.

* * *

Cooperating but Fears Price Fixing

We are cooperating with the hope that there will not be too much price fixing which will be a great handicap for us to overcome.

From a manufacturer of timers and automotive devices.

* * *

Wants Government to Finance Industry

If the Government could help the manufacturers in the way of financing their business they in turn would put lots of men back to work and they would not have to spend all this money on public works as the money they would advance would come back with interest and the taxpayer would not be out any money. As it is, what will happen?

From a manufacturer of mill and quarry machinery.

* * *

Does Not Believe in Government Dictation

We agree heartily with the President's desire to give more men employment and at wages that will allow decent living. However, although we are working under a code and in accordance with the terms of that code, we do not think the Government or any person should dictate to us and say we can work only so many hours and must pay a certain amount for labor. We particularly dislike the fact that an outside union can organize our employees and demand that we pay them a certain wage. Ours is a small shop, of fourteen employees. Of necessity we must "follow the leader." We have existed since 1928 and our employees have always received decent wages and have always been satisfied. We have dealt with them directly. We feel that it is our right and ours only to bargain with our employees concerning wages, hours, conditions, etc.

From a manufacturer of gears and sprockets.

* * *

Sees NRA Essential

Organization of the industries of the country, which was envisioned in formulating the National Recovery Act seems to us to be absolutely essential to the welfare of the country. In working out this organization, industry has the choice of (1) putting its best men into the direction of the code associations and thereby making a success of these or (2) taking a passive or antagonistic attitude toward the NRA, with the probable consequence that the people, through their Congressional representatives, will eventually force a bureaucratic control of industry.

From a manufacturer of proprietary equipment for the Navy, Army, merchant marine, etc.

* * *

Codes Restrict Display Rack Business

Restrictions placed in many codes on giving away display racks are in my opinion an act of discrimination against a method of advertising merchandise, particularly where it is almost an established custom that racks are to be supplied with merchandise for display purposes. They are effective and necessary in many cases. Such code rulings have also probably affected adversely many other concerns.

From a manufacturer of spot-welded wire specialties, etc.

* * *

Has Had No Labor Troubles

At the beginning of the NRA when business was picking up rapidly, there were indications of restlessness on the part of some of our employees, and a committee was appointed to confer with the management, but when it developed that working conditions and rates of pay with this company were better than those prevailing in our competitors' plants in this locality, the agitation soon subsided. Since that time business has fallen off to such a marked degree that we have not been able to run the full 40 hours a week allowed under the code. Consequently we are more concerned about getting orders to keep our employees at work, and they are more concerned in having us do so than in setting up any system of employee representation.

The management has to date heard nothing about any trade union for purposes of collective bargaining, and as far as union organizers are concerned, we have never seen any indication of any activity along this line since this company was started. Undoubtedly when business picks up again we will have to deal with these matters, but nothing will be done until that time.

From a manufacturer of flat cold rolled strip steel.

* * *

Simplify the Codes

Simplification of codes is needed. Too many are written by and for the employes and devote too much space to trade terms and selling prices and practices. In other words they attempt to fix up "selling power" first and then "purchasing power."

From a manufacturer of sheet metal stampings, and cast iron products.

* * *

Manufacturer's Representative Not Considered in Price Increases

In addition to our manufacturing facilities, we are also direct factory representatives of several manufacturers of power transmission equipment. They have recently increased our cost of their products by about 20 per cent. At the same time they have laid down certain selling prices that we must adhere to. In practically all cases these price changes result in an actual reduction in our margin of profit. These manufacturers justify the increase in price by the fact that they are operating under NRA codes, but they seem to overlook the fact that we also operate under such codes and that our costs of doing business has materially increased. This condition is working a hardship on the representatives of manufacturers on the Pacific Coast.

From a manufacturer of gears, chain sprockets, etc.

* * *

Make the Best of NRA

I feel that the same difficulty confronts and applies to each member of our division of the industry. At heart I am a fundamentalist, so far as the term applies to economics. I believe the approach to the problem was wrong in the very beginning. I refer to the original "share the work" plan which was started during the former administration. After once starting there was no opportunity to turn back. There is only one thing to do, go forward and make the best of it, enthusiastically support the NRA, its principles, and get out of it all that it is possible and pay for it later.

From a manufacturer of mechanical handling and conveying equipment.

* * *

Expects Stabilization Soon

We believe the monetary unit will be stabilized soon, so that contemplated private projects may proceed.

From a manufacturer of fabricated structural steel oil tanks, etc.

* * *

Finds Export Trade with Present Dollar

The most favorable factor in the present program is the dollar value which has stimulated export sales. Before the depression our export volume was about 30 per cent. It dropped to about 5 per cent. November and October were about 35 per cent, and December promises to exceed 50 per cent. Export demand has been dammed up for three years.

From a manufacturer of garage and automotive maintenance equipment.

* * *

Has 50 Per Cent Increase Under NRA

We can report about 50 per cent improvement since NRA started and believe that the prospect of labor troubles throughout the country is the biggest cloud on the horizon. All the good measures suggested by the administration could have been adopted without selling out the open shop manufacturers to the unions.

From a manufacturer of envelope and paper handling machinery.

* * *

Operation of All Codes Would Help

If all codes were approved and operative it would help our position.

From a manufacturer of steel tanks for oil, industrial and farm use.

* * *

Believe NRA Will Do Much Good

We are confident that proper operation of NRA will result ultimately in much good.

From a manufacturer of gears and speed reduction machinery.

New Things in Materials and Processes

By EDWIN F. CONE

Nickel Wrought Iron

A NEW alloyed wrought iron has recently reached the commercial stage and is being produced in fairly large quantities. A large producer of wrought iron is making a nickel product containing about 3 per cent nickel. One of the principal industrial uses is in the form of sucker rods for the oil industry where it is understood unusually satisfactory results have been achieved. There seems to be no difficulty in incorporating the nickel as an alloy in wrought iron, though, when some other alloys have been added, complete and uniform assimilation has been unsuccessful. Additions of nickel improve the physical properties, naturally, and also bestow added corrosion resistance. Because of the greater strength, less wrought iron to achieve a given result is said to be necessary.

• • •

Standardizing Surface Qualities

A MOVEMENT in standardization procedure which looms large in its importance is rapidly getting under way. The sponsors are the American Society of Mechanical Engineers and the Society of Automotive Engineers under the procedure of the American Standards Association. The subject is the classification and designation of surface qualities.

The aim is ultimately to include almost every material the surface of which is important industrially or otherwise. Five sub-committees have been appointed with the following designations:

No. 1.—On Standardization of Surfaces Produced by Tools and Abrasives.

No. 2.—On Standardization of Surfaces Produced by Mold, Die, Rolls or Any Other Means of Deforming Materials.

No. 3.—On Standardization of Coated Surfaces.

No. 4.—On Symbols for Indicating Surface Quality on Drawings.

No. 5.—On Ways, Means and Apparatus for Measuring Quality of Surfaces.

Some of these sub-committees have been organized with sub-groups appointed to take up different phases of each field.

It can be seen that the field is an exceedingly broad one and that the work involved is monumental. There is a demand for standardization of surfaces in several, and in perhaps all, of the fields covered in the general plan. The results are bound to have decided value.

• • •

"Metallurgical Problem of the Year"

HERE is a new problem for metallurgists—characterized by one of the salesmen of a large steel company as the "metallurgical problem of the year."

At one of the large public service plants of the Eastern seaboard there is in use a battery of mercury boilers, fired with fuel oil. It seems that there is an appreciable amount of vanadium in the oil being burned. In a short time a deposit of oxide of vanadium lodges on the boiler tubes with disastrous effect, resulting in the destruction of the tubes and necessitating the shutting down of the plant until new tubes can be installed.

The devastating effect of the vanadium oxides is so thorough and so rapid that a new tubing of some composition must be found to take the place of the standard carbon steel being used. There is some question whether an alloy steel will meet the severe conditions. Some believe that it will not. Of course, elimination of the vanadium from the oil is one solution of the problem, or the purchase of a different type of oil. But conditions are such that a solution of the metallurgical problem is preferred.

• • •

Nickel Bronze in Architecture

AN alloy which is being used more and more extensively for decorative architectural purposes is nickel bronze. The most conspicuous recent example of such an installation is the grille work and the doors at the western entrance of the new Waldorf-Astoria Hotel in New York City. Massive and imposing in its design, it at once arrests the eye. Exposed as it is to all kinds of weather, it resists corrosion and hence needs little attention, maintaining at all times a beautiful, subdued metallic luster much different from the ordinary bronzes in its dark brilliance. The massive frame work or grille is a casting—an impressive example of the non-ferrous founder's art.

Nickel bronze is ordinary bronze in which part of the tin has been replaced by nickel, producing, it is claimed, a tougher, smoother and more resistant metal. The nickel content runs up to 7 per cent with 9 per cent tin. A nickel bronze containing about 88 per cent copper, 5 per cent nickel, 5 per cent tin and 2 per cent zinc has an ultimate tensile strength of about 41,000 lb. per sq. in. and an elongation of 32 per cent in 2 in. These bronzes are also resistant to acids.

• • •

New Alloys of Titanium

TITANIUM is by no means a stranger to steel and iron metallurgists. For a number of years it has played an important role in steel metallurgy. In the last year or two it has come into prominent notice in the solution of problems involved in the manufacture and use of the rustless steels. So large has come to be the demand for titanium in this branch of the steel industry that several companies are now producing alloys of titanium to introduce the metal into rustless steels and also into other steel products and cast iron.

For a long time there were only two major alloys of titanium for the purpose—the so-called carbonless alloy of iron and titanium with considerable aluminum and the well-known ferro-carbon-titanium. Today there are several other alloys on the market, some containing silicon and titanium. For these there is a strong and growing demand for use in the manufacture of the various nickel-chromium and chromium-iron alloys and alloy steels.

• • •

Copper in Rustless Steels

WHEN the rustless steels were first introduced, they were rushed into certain commercial applications with the assurance that they would solve such industrial problems as acid and heat corrosion. In many such cases they have proved successful and today are being extensively used. It soon developed that certain failures ensued which precluded their use unless modified in composition or heat treatment. Metallurgical research disclosed the value of the addition of titanium or columbium; also of silicon, vanadium

or molybdenum. Now, at least two companies producing these steels are using definite percentages of copper. Copper clearly is retaining its place among useful alloying elements.

• • •

High-Chromium and Nickel Gray Iron

WHEN some 14 per cent of chromium, as well as of nickel, can be successfully incorporated in gray iron, the day of super-alloy gray irons may be said to have arrived. The comparatively new Niresist alloy cast iron contains about 12 to 14 per cent nickel and 6 per cent copper and its unusual properties have already assured it a place in industry.

The introduction of as high as 14 per cent chromium in cupola gray iron has recently been made possible by the use of ferrochromium briquets. The product is claimed to resist corrosion and growth as well as wear at high temperatures and to prevent the development of cracks. In a Western plant iron of this composition has been installed as stoker links, which have been in service since August, 1932, and the links are reported to be in practically as good condition after over 16 months service as when first put in.

Thus the higher chromium and nickel alloy gray irons, analagous to the corresponding steel compositions, are taking their place in industry and increasing the vogue of gray iron.

• • •

More on Gases in Steels

MANY have been the analytical methods proposed for determining the various gases found in steels. An important paper on this subject was presented by Lewis Reeve, research laboratories of the A. O. Smith Corpn., Milwaukee, at the sessions of the iron and steel division of the Mining Engineers Society during the annual Metal Congress at Detroit in October.

Because of the small attendance at the session at which the subject was discussed, it did not receive the attention it richly deserved. The paper covered investigations at the Smith laboratory by R. S. Archer. The methods evolved resulted in the successful determination of the quantity of oxygen and so on, combined, or not, with certain elements or in certain compositions. Previously only the total quantity of the various gases has been ascertainable.

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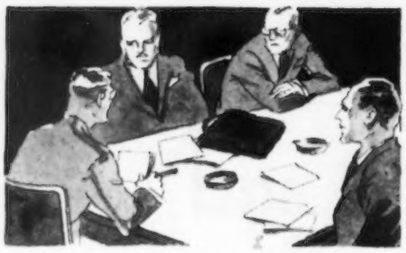
Lighter, All-Welded Freight Cars

AN all-welded steel hopper car with cast steel underframe has recently been designed and built. The one-



piece cast steel underframe, embracing the sills, hoppers, bolsters, etc., replaces in all 173 parts and about 2000 rivets, making possible a considerable reduction in maintenance costs. The superstructure of the car is of copper-bearing steel plates and structural shapes welded by the electrical process; the copper-bearing steel was adopted, of course, to insure longer life because of its resistance to corrosion.

A roof for hopper and gondola cars is getting into wide use, to give the same protection as is normally afforded by box cars for keeping dry such bulk dry-flowing materials as foundry sand, cement, iron ore, sulphur, salt, silica, coal, etc.

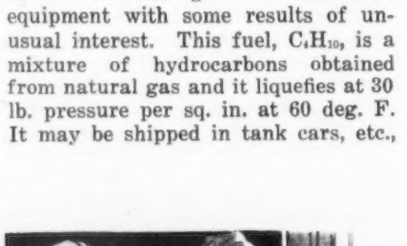
The trend toward freight cars of lighter weight is revealed by newly designed A.R.A. 50-ton capacity box cars which are nearly 4000 lb. lighter than cars of similar design previously constructed. This is a promising field for alloy steels.

• • •

Solving Some Railroad Problems

MANY heat treaters are familiar with butane as a gas fuel for heat-treating operations. It is being used in several plants for this purpose. A new use for this fuel has recently been demonstrated in California.

The Southern Pacific Lines, in cooperation with the Butane Sales Co. of San Francisco, has conducted tests with this gas for rail-motor equipment with some results of unusual interest. This fuel, C_4H_{10}, is a mixture of hydrocarbons obtained from natural gas and it liquefies at 30 lb. pressure per sq. in. at 60 deg. F. It may be shipped in tank cars, etc.,



and handled practically with the same ease as gasoline. The cost is said to be about the same as that of distillate per gallon.

The railroad has found that, in addition to the economy obtained by the use of butane, there are further advantages which cannot be overlooked by operators of rail-motor cars, particularly in view of the fact that passenger travel in the future must be induced to patronize the railroads either by faster service or additional comfort, or both. The exhaust from butane is clear and odorless and is practically all carbon dioxide. To be able to operate rail-motor cars without obnoxious fumes is a great improvement over conditions that have prevailed ever since this type of equipment came into use, but to operate them without any odor whatsoever is a distinct contribution to a more general use of such equipment and its popularity with the traveling public.

Undoubtedly the American public is on the verge of drastic changes in railroad transportation to obtain moderately greater speed. In these developments alloy steels of the less expensive type may play a larger role than is now visualized, despite the swing to rustless steels or aluminum alloys. One large producer of heavy steel plates, particularly in the larger sizes, is experimentally investigating the manufacture and demand for low alloy steel instead of the present plain carbon steel product.

• • •

"Maximeter," a New Instrument for Steel Treaters

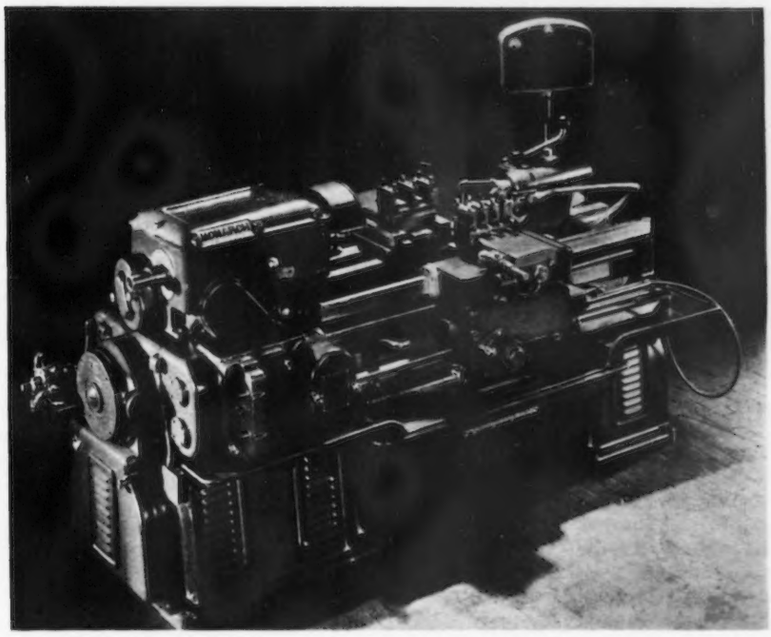
A NEW instrument to tell the temperature at which the highest toughness of steel can be obtained by tempering has been announced. It is called the Maximeter and indicates the "maxipoint" for each steel—the temperature at which hardness just gives way to ductility, or brittleness to toughness. This point is described as varying from 280 deg. to 750 deg. F. in the steels used in one industry.

J. H. Abramson, works manager of Greenlee Brothers & Co., Rockford, Ill., is reported responsible for the development. It is claimed to "abridge many other methods of testing and as extremely sensitive, showing effects of changing draw temperatures as little as 10 deg. F." It aids in finding proper hardening temperature and time, and compares results from the use of different heating and quenching mediums. A changed analysis of steel may be detected by its change of "maxipoint." Adding 0.36 per cent molybdenum in one instance is reported to have lowered the "maxipoint" 325 deg. F.

Automatic Lathe with Electrical Control Readily Changed Over for Short Runs

A FULL-AUTOMATIC lathe that is electrically controlled throughout has been introduced by the Monarch Machine Tool Co., Sidney, Ohio. In addition to new principles of control and operation, this machine, designated as the Magna-Matic, features simpler and quicker means of changing over from one job to another, which adapts it for small-lot production as well as long runs.

Magnetic clutches are employed for the carriage, tool-slide feeds and rapid traverse, as well as magnetic clutch and magnetic brake for spindle operation. Limit switches control diameters and lengths of cut. No cams are used. There are four magnetic clutches in the front gear box. Two of them provide length feed and rapid traverse return to the front carriage; the other two, through the feed rod and simplified gearing in the apron, provide "in-feed" and "out-rapid-traverse" movement or "in-rapid-traverse" and "out-feed" movement to the front carriage tool-slide. A reverse lever on the front carriage apron makes it possible to instantly reverse the cycle of the front carriage tool-slide, making it equally adaptable to "out-facing operations" and "in-feeding operations."



Magnetic clutches are employed for the carriage, tool-slide feeds and rapid traverse as well as a magnetic clutch and magnetic brake for the spindle. Limit switches control diameters and length of cut. Complete electrical control is provided in the master control switch shown above the tailstock.

The rear carriage is positioned manually at any point along the bed. The rear carriage tool-slide is controlled automatically by two magnet clutches contained in the rear gear box. They provide "in-feed" for facing or necking operations and "out-rapid-traverse-return." Pick-off gears, both at the front and rear gear boxes, give feeds ranging from 0.0046 to 0.0414 in. The "rapid-traverse-return" is 70 in. per min. to both tool-slides and front carriage.

Drive to the headstock spindle, which has a flanged spindle nose, is through gearing and chain. A high and low gear ratio of 4.4 to 1 is controlled by a lever on the front of the headstock. The headstock gearing and the pick-off speed change gears are of helical type. The normal range of spindle speeds is 41, 52, 67, 84, 108, 138, 180, 229, 296, 371, 480, 610 r.p.m. This range can be stepped up or down as desired, either through the speed of the main driving motor located in the headstock cabinet leg, or by changing the diameter of the multiple V-belt sheave on the motor. It is stated that the spindle may be safely operated at 1500 r.p.m.

The tailstock spindle has an anti-friction tailstock center, and one lever both positions and clamps it. The front carriage and tool-slide are arranged to pass the tailstock.

Complete electrical control for both set-up and full automatic operation is provided in the master control switch shown in an elevated position at the tail end of the lathe. The main starter button starts the feeds to both front and rear carriages, in addition to starting the spindle. One reverse button serves to reverse both carriages at any point in the operating cycle. Another button controls the front carriage and provides inching movement to the front and carriage for convenience of set-up. Another button gives inching movement to the rear tool-slides. The rear carriage tool cycle can be instantly timed before or after or at any intermediate point in relation to the front carriage tool travel cycle.

In changing from one job to another it is merely necessary, in addition to changing the tool set-up, to set the micrometer stop dogs for "in" and "out" front tool-slide diameter and for front carriage "length travel," and for rear carriage "in" and "out" feed travel.

Anti-friction bearings are used throughout. Carriages and tool-slides are oiled automatically by a forced-feed system, and the headstock and front and rear quick-change gear boxes are also all lubricated automatically.

The lathe may also be operated to turn various diameters and lengths, when desired, by means of a single-point tool on the front carriage. All tool movements are controlled by means of a steel template, 1/16 to ⅛ in. thick. This template is held in a bracket which bolts to the front carriage vee at the headstock end. A two-way electrical contactor switch makes contact with the template and will reproduce the shape of the work to an accuracy better than 0.001 in. The diameters and lengths turned by the front tool are controlled entirely from the template. The tools in the rear carriage tool-slide can be used for facing and necking simultaneously.

Automatic feed step-up for the front carriage travel can be provided. This is a simple electrical control mechanism that permits automatic selection of the desired feeding rate on as many as four different diameters of a shaft or piece of work.

The Magna-Matic lathe swings 15 in. over the bedways and 7 in. over the carriage. The distance between centers is 18 in., but additional distances between centers can be furnished in 12 or 18-in. increments to a maximum of 54 in. The overall floor space of machine with the 18-in. center distance is 47 by 84 in.

Reed-Prentice Corpn., Worcester, Mass., manufacturer of machine tools including engine toolroom and production lathes, vertical milling and die sinking machines, special production machinery, etc., announces the appointment of J. C. Austerberry's Sons, 684 East Congress Street, Detroit, as exclusive agents for Detroit territory.

Counterbore Features "Super-Strength" Drive

INTERCHANGEABLE counterbores and end-cutting tools incorporating a "super-strength" radial drive, developed to meet modern heavy-duty requirements, have been introduced by the Eclipse Counterbore Co., 7410 St. Aubin Avenue, Detroit.

The radial drive is a complement to the Eclipse standard pin drive for interchangeable counterbores and end-cutting tools. Counterbores with the new drive have blades ⅛ in. longer than those of the pin drive tools, but the pilots are interchangeable. Larger pilot holes are provided in the cutters, size for size, and stronger pilots can be used because of the large diameter pilot shanks.

As shown in the illustration, the drive consists of radially-arranged integral abutting surfaces located between two different sized, accurately ground cylindrical alined surfaces. Ground thrust bearing surfaces between the holder and cutter maintain alinement. The driving mechanism is positioned unusually near the cutting edges of the tools, a feature emphasized as minimizing torque.

The two driving faces are arranged exactly on a line through the common center of holder and cutter shank, and only a radial or turning action can result when the tool is in operation. This feature is emphasized as eliminating any wedging or splitting open of the holder. The cutter shank driven faces are integral, being formed with solid shanks. Two accurately ground bearing surfaces, one above and one below the drive lugs, and a ground thrust bearing maintain concentricity of the assembled tool.

Arrangement of the driving faces of the new Eclipse counterbore (at left) is shown above.

The double-drive mechanism in the holder is also integral; it is machined from the solid and hardened and ground throughout. A simple lateral internal lock retains the cutter in positive driving position, eliminating vibration and maintaining constant thrust.

Radial drive counterbores, countersinks and multi-diameter boring cutter are supplied on standard and special sizes from ¾ to 4½ in. in diameter.

A. S. M. E. Receives Barth Tool Gages

DEPTH of cut gages and tool contour gages used by Carl G. Barth, consulting engineer, Philadelphia, a pioneer in cutting tool investigations and an associate of Frederick W. Taylor, have been presented to the American Society of Mechanical Engineers. There gages were used in connection with metal cutting experiments at plant of William Sellers & Co., Philadelphia, as early as 1902. In addition to historical interest they will be valuable in the program of experimental work of the A. S. M. E. subcommittee on metal-cutting data, the secretary of which is Robert C. Deale, consulting engineer, New York.

Mill-Type Shear Cuts Circles from Square Plates

THE Quickwork Co., St. Marys, Ohio, recently shipped to the Inland Steel Co., Indiana Harbor, Ind., the mill-type circle shear illustrated, which has capacity for cutting circles up to 96 in. in diameter from square mild-steel plate of various thicknesses up to ⅜ in. at a speed of 75 ft. per min.

The cutters run continously. The upper one is raised and lowered instantly by a crank which is actuated by a swinging member. A 15-hp. motor drives the machine. The square plate is clamped pneumatically in the circle cutting attachment, and because of the Quickwork laterally self-adjusting principle a true round head with a clean square edge is cut without first having to cut the corners off the plate.

Major parts of the machine are made of welded steel plate. All shafts, with two exceptions, are mounted in anti-friction bearings, and all reduction gears run in oil. With this construction it was found that the entire machine could be easily turned over by revolving the motor pinion with one hand.

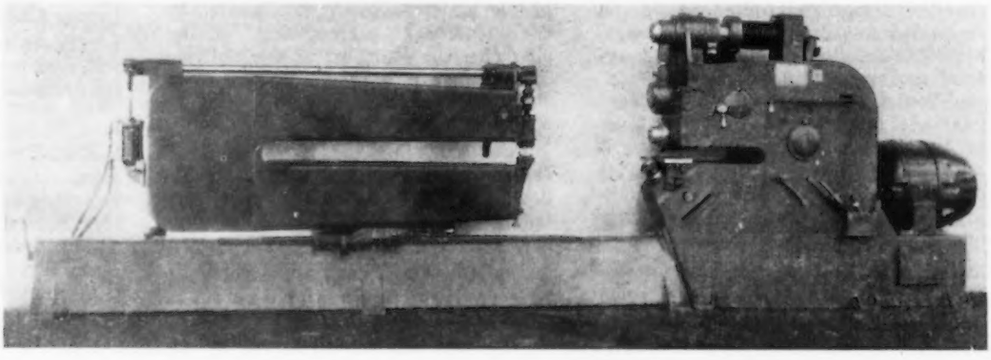
To Make New Titanium Carbide Cutting Tools

AMERICAN CUTTING ALLOYS, INC., 347 Madison Avenue, New York, plans to start production of Cutanit, the new titanium carbide hard metal, within the next few months. This material is said to have superior characteristics for cutting steel, including high-carbon and alloy steels. It is used like the older cemented carbides, and in addition to lathe and similar tools it is offered for wearing parts of micrometers, go and no-go gages and the like. Only one grade is made, this being said to be suitable for cutting all materials.

Advantages claimed include high-speed cutting, ability to take heavy cuts, and the maintaining of high finish and close tolerances. The makers of Cutanit attribute these features to the material's high resistance to oxidation, which enables it to withstand much higher heat than the more familiar hard carbides; and to high resistance to wear and abrasion, which enables the cutting edge to stay sharp and smooth for unusually long periods. Also, the chemical composition and microstructure are said to permit smoother cutting and high strength and toughness to permit the tool to stand up well under heavy and intermittent cuts.

The material will be furnished in the same forms as the older carbides. It is attached to the steel shank of the cutting tool by means of copper brazing, and may be ground and lapped by the same equipment used for the tungsten and tantalum carbides.

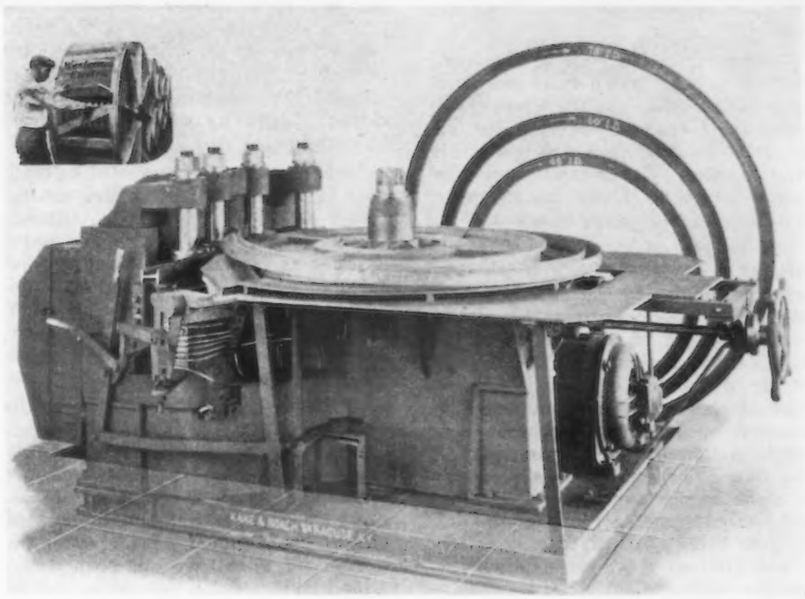
(Below) Circles up to 96 in. diameter can be cut from square plate up to ⅜-in. thick at a metal travel speed of 75 ft. per min. The cutters run continuously.



Bends I-Beam Rims for Electric Cable Reels

A HORIZONTAL wrapping-type bending roll for bending I-beams used as rims for electric cable reels has been built by Kane & Roach, Inc., Syracuse, N. Y. Application of these rims is shown at the upper left in the accompanying illustration of the machine.

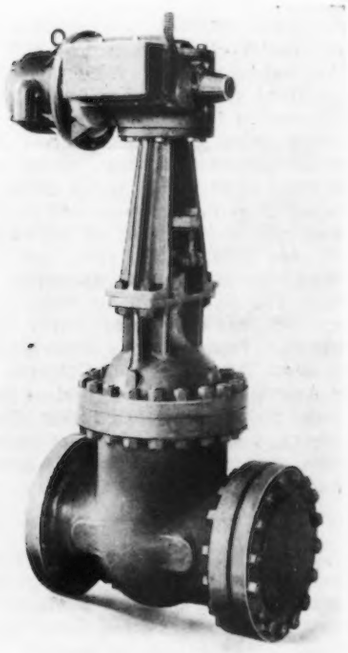
Three-inch I-beams weighing 5.7, 6.5 and 7.5 lb. per ft. are bent into rings having an inside diameter ranging from 48 to 78 in. A feature emphasized is that the stock is bent practically to a true circle complete to the ends, thus eliminating waste on the ends. The machine is driven by a 30-hp. 1140-r.p.m. motor and is provided with electrical control, with forward reverse-stop push button. In addition it is equipped with a friction clutch, operated by hand lever. Production is said to be at the rate of 45 lineal ft. per min.



Three-inch I-beams weighing from 5.7 to 7.5 lb. per ft. are bent to form the rims for the cable reels shown in the insert.

Improved Electric Valve-Operating Unit

THE Philadelphia Gear Works Inc., Philadelphia, announces complete redesign of its Limitorque electric valve-operating mechanism. This control consists of a self-contained reducing gear unit with built-in mechanical and electrical limit devices.



Limitorque valve operator applied to large valve. The entire mechanism is immersed in a six-months supply of oil. The unit may be used also for operating heavy doors, monitor sash, dampers and other units.

The valve-operating nut that raises and lowers the valve disk is incorporated in the casing and supported by heavy-duty Timken bearings. The motor speed, 1800 r.p.m., is first reduced by a low-ratio helical gear and the final reduction is by a steel worm and bronze worm gear. The entire mechanism is immersed in oil and needs no attention for six months after installation. With every moving part inclosed, the unit is dust and moisture proof and may be operated in any atmosphere or outdoors.

Three sizes, which, with two motors per frame, give six different combinations, are available for operating valves ranging from 3 to 72 in. in diameter. Sizes for valves up to 24 in. are capable of exerting pressures up to 600 or 1000 lb. per sq. in. The Limitorque may be used in connection with all types of gate and globe valves, and also for operating sluice gates, dampers, heavy factory and garage doors, monitor sash and for any unit having a definite movement that must be moved and stopped or reversed at the end of its travel. It is equally adaptable to existing hand-operated valves.

Advantages emphasized include correct application to the valve, with the elimination of external gearing. By means of the torque switch, the valve stem and operating parts are protected again breakage, should the movement of the valve disk be obstructed by foreign matter. The control tightly seats the disk to any degree of seating pressure. Hand operation is always available simply by attaching a handwheel to the extended shafts, no magnetic or hand clutch being employed.

Involute Checker Operates Rapidly

A UNIVERSAL involute checking device for which neither master forms nor master base circle disks are required has been brought out by the Michigan Tool Co., Detroit. Unusually rapid readings may be made, and charting for comparison with other

This involute checker employs a sine bar. Charting for comparison with other checking devices is readily accomplished.

checking devices is readily accomplished.

This machine employs a sine bar, the function of which is to act as a compensator for the difference between the length of arc of 1 deg. on the friction disk that originates all the machine movements, and the length of arc of 1 deg. on the base circle of the gear being checked.

The friction disk, which is integral with the work-holding spindle, imparts movement to the sine bar carriage. Each degree of rotation of the work is shown on a scale alongside the sine bar carriage. The angular setting of sine bar controls the movement of the indicator head, which is mounted on balls in V-grooves and counterweighted to hold it against the sine bar. The indicator head moves at right angles to the movement of sine bar carriage so that the smaller the gear being checked, in comparison to the friction disk, the smaller the angular setting required on sine bar.

By use of two indicators and a reversible indicator finger, both sides of a gear tooth may be checked without dismounting, turning gear upside down, or otherwise changing the setup. This feature is emphasized as making possible more consistent checking. The capacity, 12 in. in diameter by 12 in. in length, is ample for most work.

Static Balancers Feature Rapid Operation

STATIC balancers, designated as the Hi-Eff, for balancing flywheels, pulleys, pump impellers, gears and similar parts have been introduced by the Taylor Mfg. Co., 2330 West Clybourn Street, Milwaukee. They are universal in application, as they permit parts of various shapes and sizes to be balanced in quick rotation without change in set-up. The only adjustment required is the turning by the fingers of the threaded portion of the centering spindle. This adjusts the weighing fulcrum to the center of gravity of the part to be balanced.

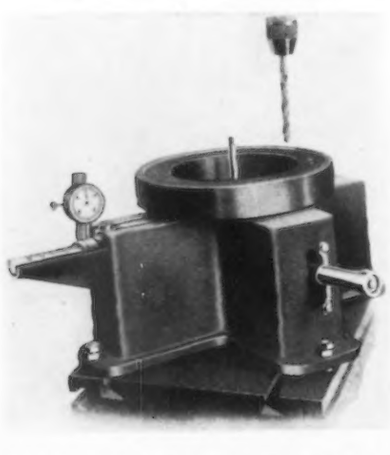
Unbalance can be corrected as close as 0.01 oz.-in. on the smaller models to 0.1 oz.-in. on the largest. Standard models are made to handle parts as light as 1 oz. and as small as 1 in. in diameter. Larger sizes are designed to balance parts up to 48-in. diameter and weighing up to 600 lb., and still special larger models can be furnished special.

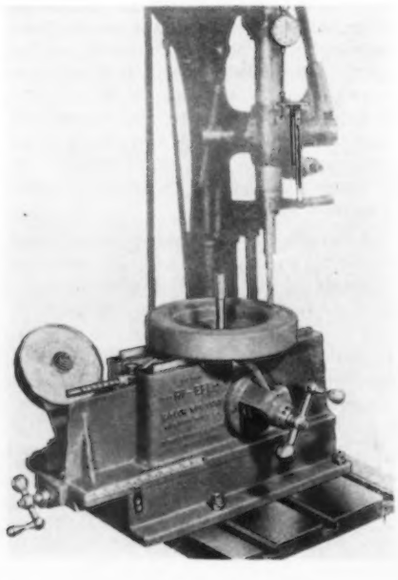
A feature of these balancers, the locating of the heavy spot, accomplished almost instantaneously through the use of a sensitive spirit level. Weighing of unbalance is accomplished either by a hand-operated beam or an automatic dial. After the amount of unbalance has been determined the number of holes to be drilled and their depth is indicated on the automatic calculator, shown at the left of the machine illustrated. It is stated that as this device does all the calculating, an ordinary drill-press hand can operate the machines.

Another feature is that if the particular spot where the excess material is to be removed should prove to be so hard as to make drilling difficult or impossible, a crank can be turned to move the part to a new position. The automatic calculator moves in synchronism with the base and automatically registers the drilling data for the new position.

In addition to models designed for use on any available drill press, production line models with integral base and drill head are built. Models for balancing light-weight parts are of the lever type, as shown in the illustration; they can be had for use on any available drill press or in production line models. Another model has been developed for balancing polishing wheels, where unbalance is compensated for by nailing lead slugs on to the side of the wheel. No weighing beam is used on this type balancer.

The Hi-Eff balancer with automatic calculator for number of holes and depth to be drilled is shown at right. The machine below is of lever type, for balancing light-weight parts.





Cast Iron Symposium Is Available

CAST iron as an engineering material is the subject of a pamphlet, now available, which is replete with information for the user as well as producer of iron castings. The publication may be described as a complete summary of the engineering properties of cast iron, and its high order is attested by the fact that it is the work of a committee of notables in the field of foundry metallurgy. The committee was appointed jointly by the American Society for Testing Materials and the American Foundrymen's Association. It called a meeting of the two associations at Chicago, June 26, 1933, to receive the report, and the result is a treatise that will prove a valuable reference book for the foundryman, the engineer and the buyer of castings.

In its total of some 160 pages it deals at some length on the metallurgy of cast iron, including alloy cast irons. About half of the publication takes up physical and mechanical properties, including such matters as impact resistance, creep effect of size of section, damping capacity, properties at both elevated and subnormal temperatures, growth, and corrosion and heat resistance.

Separate divisions are devoted to heat treatment, to white and chilled irons, and to welding. A considerable amount of space is given over to a discussion of factors of importance in foundry technique. Classification and specifications for castings round out the book. The report is the third of a series of symposia sponsored by the organizations; the first, on malleable iron, was published in 1931, and the second, on cast steel, appeared in 1932. The Symposium on Cast Iron may be obtained from either the American Foundrymen's Association, 222 West Adams Street, Chicago, or the American Society for Testing Materials, 260 South Broad Street, Philadelphia, for $1 a copy, except in lots of five or more when different prices obtain depending on the quantity.

A pamphlet tabulation of American standards has been issued by the American Standards Association, 29 West Thirty-ninth Street, New York. In the category of mechanical engineering there are some 45 standards, ranging from a safety code for abrasive wheels, costing 5c., to a milling cutter standard, listed at 75c., and a code for design of transmission shafting, also 75c.

THE NEWS OF THIS WEEK

Steel Ingot Production Scores 18 Per Cent Advance in December

PRODUCTION of open-hearth and Bessemer steel ingots in December was 1,819,648 gross tons, according to the American Iron and Steel Institute, which represented an advance of 18 per cent over the 1,540,882 tons produced in the preceding month. December's daily rate of output in the 25 working days was 72,786 tons, or 33.48 per cent of capacity, compared with 59,265 tons, or 27.26 per cent in November. Production in December, 1932, was 861,034 tons, or 33,117 tons daily, engaging the industry's available capacity at 15.31 per cent.

Bessemer and open-hearth steel ingot output for 1933 amounted to 22,878,571 tons, compared with 13,322,833 tons produced in 1932. This increased activity for 1933 represents an improvement over 1932 of over 71.7 per cent.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Gross Tons)
Reported for 1933 by Companies Which Made 96.57 Per Cent of 1932 Ingot Output

1933	Open Hearth	Bessemer	Calculated Output All Companies: Monthly	Calculated Output All Companies: Daily	No. of Working Days	Per Cent Operation
January	885,743	109,000	1,030,075	39,618	26	18.23
February	922,806	126,781	1,086,867	45,286	24	20.83
March	784,168	94,509	909,886	33,699	27	15.50
April	1,180,893	135,217	1,362,856	54,514	25	25.08
May	1,716,482	216,841	2,001,991	74,148	27	34.11
June	2,211,657	296,765	2,597,517	99,904	26	45.96
July	2,738,083	355,836	3,203,810	128,152	25	58.95
August	2,430,750	370,370	2,900,611	107,430	27	49.42
September	1,991,225	242,016	2,312,562	88,944	26	40.92
October	1,847,756	191,673	2,111,866	81,226	26	37.37
November	1,331,091	156,939	1,540,882	59,265	26	27.26
December	1,624,447	132,787	1,819,648	72,786	25	33.48
Twelve months	19,665,101	2,428,734	22,878,571	73,801	310	33.95

The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1932, of 67,386,130 gross tons for Bessemer and open-hearth steel ingots.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Gross Tons)
Reported for 1932 by Companies Which Made 93.71 Per Cent of 1931 Ingot Output

1932	Open Hearth	Bessemer	Calculated Output All Companies: Monthly	Calculated Output All Companies: Daily	No. of Working Days	Per Cent Operation
January	1,230,907	160,633	1,484,991	57,115	26	26.41
February	1,230,970	157,067	1,481,253	59,250	25	27.40
March	1,149,193	193,944	1,433,337	53,087	27	24.55
April	1,036,163	144,197	1,259,629	48,447	26	22.40
May	950,838	103,593	1,125,243	43,279	26	20.01
June	755,068	100,249	912,757	35,106	26	16.23
July	653,039	102,916	806,722	32,269	25	14.92
August	696,122	97,323	846,730	31,360	27	14.50
September	804,470	124,970	991,858	38,148	26	17.64
October	885,773	132,876	1,087,058	41,810	26	19.33
November	838,419	128,844	1,032,221	39,701	26	18.36
December	724,917	81,932	861,034	33,117	26	15.31
Total	10,955,879	1,528,544	13,322,833	42,701	312	19.75

The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1931, of 67,473,630 gross tons for Bessemer and open-hearth steel ingots.

Steel Code Enforcement Investigators Named

THE board of directors of the American Iron & Steel Institute announce the appointment of Alexander Baxter and George Satterthwaite as special investigators, as part of the program of the code authority for enforcement of the provisions of the steel code.

Mr. Baxter formerly was a partner of a well known firm of certified public accountants and Mr. Satterthwaite was an executive of a prominent independent steel company.

In announcing this step to the members, W. S. Tower, executive secretary, said that the duty of the investigators "shall be to assist the administrative committee in seeing that the members perform their obligations thereunder, including the investigation of all alleged violations of the provisions of the code which may be reported."

In the official notice, members are urged to give full cooperation in the enforcement effort, and they are reminded that it is their duty to report promptly any facts coming within their knowledge respecting code violation.

The Iron and Steel Division, Department of Commerce, has been transferred to the Investment Building, Fifteenth and K Streets, N. W., Washington. With other commodity divisions, the Iron and Steel Division was transferred from the Department of Commerce Building to make way for a section of the Civil Works Administration.

British Steel Cartel in Prospect—Demand is Still Well Maintained

LONDON, ENGLAND, Jan. 9 (*By Cable*).—Home trade expansion is maintained, but export demand is still quiet. More blast furnaces have been relit, and others are being prepared. Pig iron prices are unchanged but an advance is being talked of. Steel is more active and semi-finished producers are heavily sold. Ship construction and engineering orders are being specified more freely.

Tin plate is dull and prices have eased on lack of business. Keen competition from the United States, Germany and Italy is reported in the Far East.

British National Committee is expected shortly to submit proposed plans for steel reorganization to associations concerned. The reform of the industry is to be largely supervised by proposed British Iron and Steel Corporation and five to 10 years is suggested as a minimum time in which the efforts of all concerned should be concentrated on obtaining and maintaining industrial prosperity. The British corporation will not own or control works.

Continental iron and steel markets are quiet. An International Ship Plate Cartel is on point of formation to regulate prices and fix January-June quotas on ship steel. The British home and Empire ship steel markets are to be reserved for British steel makers.

Russia has bought an additional 36,000 tons of Polish steel.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9		
Billets, open-hrth.	£5 10s.	to	£5 12s. 6d.
Black sheets, Japanese specifications	£11		
Tin plate, per base box	16s.	to	16s. 6d.
Steel bars, open-hearth	£7 17½s.	to	£8 7½s.
Beams, open-hrth.	£7 7½s.	to	£7 17½s.
Channels, open-hearth	£7 12½s.	to	£8 2½s.
Angles, open-hearth	£7 7½s.	to	£7 17½s.
Black sheets, No. 24 gage	£9 5s.		
Galvanized sheets, No. 24 gage	£11 5s.	to	£11 15s.

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

*Ingots	£2 5s.		
*Billets, Thomas..	£2 7s.		
Wire rods, No. 5 B.W.G.	£4 10s.		
Black sheets, No. 31 gage, Japanese	£11 5s.		
*Steel bars, merchant	£3 2s.	6d.	
*Sheet bars	£2 8s.		
Plates, ¼ in. and up	£4 1s.	6d.	
*Plates, ⅜ in. and 5 mm.	£4 3s.	6d.	
*Sheets, ⅛ in.	£4 8s.	6d.	
*Ship plates	£4 10s.		
*Beams, Thomas.	£2 19s.		
*Angles (basis)..	£3 2s.	6d.	
Hoops and strip steel over 6-in. base	£3 17s.	6d.	
Wire, plain, No. 8	£5 7s.	6d.	
Wire nails	£5 15s.		
Wire, barbed, 4-pt. No. 10 B.W.G..	£8 15s.		

*Prices as established by European Raw Steel Cartel.

Weir Praises Employee Representation—Asks That New Deal Be Square Deal

DECLARING that so far as his company was concerned there would never again be any general wage reduction without the specific approval of the elected employees' representatives of the company, E. T. Weir, chairman, National Steel Corpn., Pittsburgh, speaking at a conference held at Philadelphia, Jan. 5, under the auspices of the American Academy of Political and Social Science, vigorously defended employee representation plans and outlined the benefits derived by his own employees in substantiation.

"Labor has been unreasonably liquidated," Mr. Weir said, "and no good has come of it. In fact, harm has resulted as a result of restricted individual purchasing power."

Referring to his recent disagreement with the National Labor Board over the supervision of employee representative elections in the plant of the Weirton Steel Co., Mr. Weir said: "Many of us believe that employee organizations are of more value to workers than national unions. We are all seeking to achieve the same end, that is, improvement of workers and working conditions, and because many of us believe that this can be accomplished better without the commercialized national unions we are sometimes severely criticized. The newspapers have construed my opinions in that respect as a challenge to the National Industrial Recovery Act. I have firmly supported the act; I believe in its principles; but I differ with the National Labor Board in its efforts to force national unions upon employers."

Flays Labor Organizers

Declaring he had no quarrel with organized labor per se, he scathingly rebuked the type of labor leadership which attempts to extend its field of influence by strike and violence. "I question the perception and sincerity of many of today's labor leaders," he said, "and I am firmly convinced that the plan in operation at Weirton, and similar plans in other industrial organizations, not only fully comply with the full meaning and intent of section 7a, of the NIRA, but that this type of plan is best adapted to insure amicable relations between management and labor. I think it would be a grave error to disrupt such arrangements which give such great promise of a new era of peaceful partnership in industry.

"The granting of such extensive rights to labor to participate with management in decisions affecting the interests of both carries with it a correlative responsibility. The leaders of labor, if they are to help decide the vital questions affecting industry, must be held responsible to those who elect them for their decisions.

"I believe that it will be a fine thing for industry if the representatives of labor are taken into the confidence of management in decisions which affect the welfare of both. I have the utmost confidence in American workmen and believe that they will understand better the problems confronting management if they are consulted not only about matters of wages and working conditions but also of manufacturing and marketing and other competitive factors having a direct influence on continuity of employment."

Machine Not Blamed

He denied that the machine had caused ill effects to our social or economic system or that it was responsible for the fluctuations in the business cycle. To steam and electric power he attributed our progressive state of civilization and high living standard.

Wants "New Deal" to Be Square Deal

Mr. Weir expressed the opinion that the most urgent problems before us were those of providing unemployment reserves and retirement pensions. He also pledged his support of the "New Deal," as follows: "I pledge my unqualified support of the President's recovery program, but coupled with this I also have considerable faith in and an abiding respect for much of the old deal. But new or old deal, we must have a reasonable assurance that it will be a square deal. The surest test of a square deal is that both parties are satisfied."

... PERSONALS ...

EDWIN S. MILLS, whose retirement as vice-president and general manager of sales, Illinois Steel Co., Chicago, was announced in THE IRON AGE last week, has been in poor health for several months and is at present recuperating at Stockbridge, Mass. He attended school at Cleveland and entered the employ of the Carnegie Steel Co. in 1895. Later he was made general manager of the Pittsburgh Steamship Co., at that time Cleveland agent for the Oliver Iron Mining Co. When the Steel Corporation was organized, he went to New York as assistant to a vice-president and in 1910 he became sales manager for Carnegie company at Chicago. In 1919, Mr. Mills was appointed general manager of sales of the Illinois Steel Co., and in 1926 he was made vice-president and general manager of sales.

E. S. MILLS

WILLIAM I. HOWLAND, JR., who succeeded Mr. Mills, was graduated from Yale in 1908 and started to work for the Illinois company in that year at South Works, Chicago, as mechanical engineer. After 5½ years' operating experience he was transferred to the sales department on electric and alloy steel. He entered the United States Navy in 1917 and returned to the Illinois company in 1919. He has been assistant general manager of sales in charge of bars, strip and alloy steel since 1926.

W. I. HOWLAND, JR.

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EUGENE G. GRACE, president of the Bethlehem Steel Co., has announced the appointment of the following three new vice-presidents: F. A. SHICK, vice-president and comptroller, J. M. LARKIN, vice-president in charge of industrial and public relations, and C. R. HOLTON, vice-president in charge of purchases.

Mr. Shick, who has been identified with the company since 1906 and since 1907 as comptroller of Bethlehem Steel Corpn. and its subsidiary companies, has made important contributions to efficient statistical and accounting practices in the steel industry.

Mr. Larkin 30 years ago started to work as an apprentice draftsman and during that time has had wide experience in labor affairs, both as an employee and in training and directing working forces. He has taken an important part in the development of Bethlehem's labor relations and associated industrial questions. He was made assistant to the president in 1918, when Bethlehem inaugurated its plan of employee representation, and was in direct charge of the work-sharing program carried on by the company.

Mr. Holton has been identified with the steel industry for almost 33 years, and with Bethlehem or companies acquired by Bethlehem since 1906. He joined the purchasing department of the company in 1916 and was made assistant purchasing agent in 1917, purchasing agent in 1920 and a director of the company in 1925. In his new office he will be in charge of purchasing for all Bethlehem companies.

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J. C. WILLIAMS, president, Weirton Steel Co., Weirton, W. Va., has announced the following appointments: E. J. ANGLIN, general superintendent, succeeding G. W. VREELAND, who has resigned because of poor health; J. S. WILLIAMSON, assistant general superintendent; H. E. MCDONNELL, manager, steel works; M. GUIRAND, assistant manager, steel works; P. R. CHURCH, superintendent of blooming mill; A. M. BAKER, superintendent of blast furnaces; HENRY RUDOLF, assistant superintendent of blast furnaces, and LUTHER RENFREW, assistant superintendent of coke works. T. E. MILLSOP has been elected vice-president of the company.

FRANK WEILER, vice-president of James J. Weiler & Sons, Inc., Huntington, W. Va., fabricator of structural steel, has been elected president, succeeding the late JAMES J. WEILER, founder of the company. CHARLES T. WEILER has been elected vice-president.

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JOSEPH E. OTIS, JR., has been elected president of the Stewart-Warner Corpn., Chicago. This position was made vacant by the resignation last July of C. B. SMITH. T. T. SULLIVAN has been made acting secretary of the company.

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WARREN BICKNELL has been elected director of the National Acme Co., Cleveland, to fill the vacancy caused by the recent death of GEORGE E. RANDLES.

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WILLIAM M. HORTON has been made factory manager of the Ferry Cap & Set Screw Co., Cleveland. After serving a four years' apprenticeship in tool making, machine shop work and drafting at the Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., he went to Cleveland in 1912 and was connected for 15 years with the Kirk-Latty Mfg. Co. After the consolidation of this company with Lamson & Sessions Co., he served as assistant director of operations of the latter company.

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CONRAD TRUBENBACH, long associated with the Max Ams Machine Co. as treasurer and sales manager, has established a new company, to be known as The Trube Co., with offices at 101 Park Ave., New York, to furnish a comprehensive engineering service and to supply quality can-making and sheet metal-working machinery and equipment.

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FRED D. SHAW, Walker-Pratt Mfg. Co., has been made president of the New England Foundrymen's Association.

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HEBER G. STOUT, export manager, Chain Belt Co., Milwaukee, will sail Feb. 2 from San Francisco for Manila, P. I., and later will go to Honolulu for business observation and negotiation. He will be away eight to nine months.

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R. L. SOMMERVILLE has been appointed manager automotive replacement sales for the Electric Storage Battery Co. Mr. Sommerville was connected with the New York office of the company for 12 years prior to his transfer to the general offices in Philadelphia a year and a half ago.

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W. LACOSTE NEILSON, vice-president in charge of sales of the Norton Co., Worcester, Mass., has announced the following changes in personnel: HARRY K. CLARK, sales manager, grinding wheel division, promoted to general sales manager; WILLIAM R.

MOORE, director of market research, promoted to sales manager, grinding wheel division, succeeding Mr. Clark; HUGH D. BUTLER, of Boston, district compliance director of New England for NRA, appointed director of market research.

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CHARLES T. SCOTT has been made sales representative in the Chicago district with offices at 110 South Dearborn Street, for the Granite City Steel Co., Granite City, Ill.

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WILLIAM M. LESTER has opened an office as a consulting engineer specializing in die and pressure casting of non-ferrous metals at 29 Broadway, New York.

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D. J. ALMON, with office at 455 Paul Brown Building, St. Louis, has been appointed district sales agent in the Southwest for Morrison Metalweld Process, Inc., Buffalo.

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C. J. KING has been elected president of the General Regulator Corpn., New York. R. A. WRIGHT and F. H. PLUM have been made vice-president and secretary respectively. The above officers were formerly president, sales manager and vice-president in the order named of the Smoot Engineering Corpn. J. W. ACKLEY is treasurer of the Regulator Company.

Youngstown to Extend Electric Weld Mill

YOUNGSTOWN SHEET & TUBE CO. is arranging to extend its present electric weld mill at its Brier Hill plant at Youngstown, where it is now manufacturing 18 to 26-in. pipe down to ranges between 8 and 16-in. and intermediate sizes. The cost will be approximately $500,000. The company's facilities have already been expanded to include the manufacture of railroad spikes.

Division Administrator Malcolm Muir Resigns

MALCOLM MUIR, Division Administrator of the National Recovery Administration, has resigned in order to devote his full time to his duties as president of the McGraw-Hill Publishing Co., New York. Mr. Muir was one of the chief aides of General Hugh S. Johnson since the inception of the NRA and said he leaves the NRA with regret. He declared that the NRA is a success and predicted continuing gains during the present year until the ultimate goal of normal business activity is reached. General Johnson in a letter to Mr. Muir praised the latter for his work with the NRA.

OBITUARY

STEWART JOHNSTON, chairman, Pittsburgh Steel Foundry Corpn., died recently at his home at Pittsburgh. A native of Pittsburgh, he attended local schools and in 1887 was graduated from Rensselaer Polytechnic Institute. He began his career in the drafting room of the Pittsburgh Steel Casting Co., becoming assistant superintendent in 1888, and superintendent in 1889 when the company was merged with the American Steel Casting Co. He served as president of the Pittsburgh Steel Casting Co. and general superintendent of the American Steel Casting Co. from 1890 to 1896. He organized the Pittsburgh Steel Foundry Co. in 1898, and was president of the company until 1925, when he became chairman of the board of directors.

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THOMAS FINIGAN, first vice-president of the American Brake Shoe & Foundry Co., New York, died at his home in Chicago on Dec. 25, aged 51 years. He entered the mechanical department of the Consolidated Traction Co., Newark, N. J., and in 1902 became identified with the United Railways at San Francisco. He remained with United Railways, which he served as purchasing agent and assistant general manager, until 1915, when he resigned to become Pacific Coast manager of the American Brake Shoe & Foundry Co. Three years later he was elected vice-president, with headquarters at Chicago, which position he held until 1929, when he became first vice-president.

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CLINTON S. MARSHALL, former district manager of the American Steel & Wire Co. for the Worcester, Mass., New Haven, Conn., and Trenton, N. J., district, died at his home in Grafton, Mass., on Jan. 1. Mr. Marshall was born in Rutland, Mass., Feb. 6, 1860. At the age of 18 he entered the employ of the former Washburn & Moen Mfg. Co.; two years later he went with the Morgan Construction Co., where he eventually became superintendent. He resigned to return to the Washburn & Moen Mfg. Co. to organize a spring manufacturing department, but became assistant to the superintendent of the American Steel & Wire Co., South Works, in 1901, and rose by steady promotions to head of the northeastern district. He retired from business a few years ago.

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CHARLES W. HOLT, founder and president, Holt Electric Motor Co., Milwaukee, died Dec. 22 of a cerebral hemorrhage. He was 74 and a native of Ellsworth, Me., going west in 1892 and to Milwaukee in 1902. He gained wide note as an industrial motor specialist in design and maintenance.

CHARLES STOLPER, JR., founder and president, Stolper Steel Products Co., metal stampings, Milwaukee, died Dec. 25 at his winter home in Coral Gables, Fla. He was born in Milwaukee in 1872.

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OTTO J. BOETTCHER, general superintendent of the branch plant of the Aluminum Specialties Co., Manitowoc, Wis., in Chilton, Wis., died of heart disease on Dec. 26, aged 43 years.

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JOSEPH L. TILLMAN, SR., president of the Industrial Steel Casting Co., Toledo, died on Jan. 1, aged 67 years.

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JOSEPH S. OECHSLE, a consulting engineer of the Worthington Pump & Machinery Corpn., died at the Hahnemann Hospital in Philadelphia on Dec. 24, aged 39 years. Mr. Oechsle was one of the founders and subsequently president of Metalweld, Inc., Philadelphia, manufacturer of portable air compressors, before that company was consolidated with Worthington in 1931.

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EVERETT MORSS, president of the Simplex Wire & Cable Co., and for many years a member of the corporation of the Massachusetts Institute of Technology, died at his home in Everett, Mass., Dec. 27. He was born in Boston, March 6, 1865. During the war he was head of the brass section of the War Industries Board.

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DAVID KENDALL, general manager, Alliance Machine Co., Alliance, Ohio, died Jan. 2 of a heart attack while spending the holidays at the home of a son in Hartford, Conn. He was 68 years of age. A native of Barrow-in-Furness, England, Mr. Kendall came to this country in 1887 and became connected with the Morgan Engineering Co., Alliance. He remained with that company until 1901 where he had attained the post of general superintendent. In that year he went with the Alliance Machine Co., which had just been formed and with which he remained until the time of his death. He attained prominence as one of the leaders in the development of the electric traveling cranes used in steel mills and had a wide acquaintance in that industry.

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WILLIAM H. JONES, prominent metallurgist and assistant superintendent of the armor plate department at the Carnegie Steel Co., Homestead, Pa., plant, died recently at his Pittsburgh home. A native of England, he came to the United States many years ago. He had been employed by the Carnegie company for 40 years, and held a patent for a steel hardening process.

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MAJ. WALTER GRANT PENFIELD, construction engineer for the United States Treasury Department, and formerly works manager, Remington Arms Co., Bridgeport, Conn., died at Hartford, Conn., on Jan. 3, aged 61 years.

Pig Iron Output Up 5.4 Per Cent in December

PRODUCTION of coke pig iron in December totaled 1,182,079 gross tons, compared with 1,085,239 tons in November. The daily output in December, at 38,131 tons, showed a gain of 5.4 per cent over the November daily rate of 36,174 tons. Production for the year was 13,212,785, against 8,686,443 for 1932. The daily rate last year was 38,131 gross tons, which represented a gain of 52.5 per cent over the daily rate of 23,733 tons in 1932.

There were 75 furnaces in blast on Jan. 1, making iron at the rate of 35,505 tons a day, compared with 76 furnaces on Dec. 1, operating at the rate of 34,410 tons a day. Five furnaces were blown in during December and six furnaces were blown out or banked, making a net loss of one furnace. The Steel Corporation put three furnaces in operation and blew out or banked five. Other steel companies blew two in and put one out.

Among the furnaces blown in are the following: One Haselton, Republic Steel Corpn.; one Campbell, Youngstown Sheet & Tube Co.; two Ensley and one Fairfield, of the Tennessee Coal, Iron & Railroad Co.

Furnaces blown out or banked include: One Carrie, two Duquesne, one Edgar Thomson of the Carnegie Steel Co.; one South Chicago old, of the Illinois Steel Co., and the Portsmouth furnace of the Wheeling Steel Corpn.

Daily Average Production of Coke Pig Iron

Gross Tons

	1933	1932	1931
January	18,348	31,380	55,299
February	19,798	33,251	60,950
March	17,484	31,201	65,556
April	20,787	28,430	67,317
May	28,621	25,276	64,325
June	42,166	20,935	54,621
½ year	24,536	28,412	61,356
July	57,821	18,461	47,201
August	59,142	17,115	41,308
September	50,742	19,753	38,964*
October	43,754	20,800	37,848
November	36,174	21,042	36,782
December	38,131	17,615	31,625
Year	36,199	23,733	50,069

Production of Coke Pig Iron and Ferromanganese

Gross Tons

	Pig Iron*		Ferromanganese†	
	1933	1932	1933	1932
January	568,785	972,784	8,810	11,250
February	554,330	964,280	8,501	4,010
March	542,011	967,235	4,783	4,900
April	623,618	852,897	5,857	481
May	887,252	783,554	5,948	5,210
June	1,265,007	628,064	13,074	7,702
½ year	4,441,003	5,168,814	47,063	33,562
July	1,792,452	572,296	18,661	2,299
August	1,833,394	530,576	16,953	3,414
September	1,522,257	592,589	13,339	2,212
October	1,356,361	644,808	16,943	2,302
November	1,085,239	631,280	14,524	5,746
December	1,182,079	546,080	9,369	7,807
Year	13,212,785	8,686,443	136,762	57,342

*These totals do not include charcoal pig iron. The 1932 production of this iron was 15,055 gross tons.
†Included in pig iron figures.

Merchant Iron Made, Daily Rate

1933	*Tons*	1932	*Tons*
January	2,602	January	6,256
February	2,863	February	7,251
March	2,412	March	7,157
April	1,908	April	5,287
May	3,129	May	4,658
June	4,088	June	6,090
July	6,783	July	3,329
August	7,756	August	3,070
September	10,034	September	3,213
October	8,634	October	4,286
November	7,639	November	4,435
December	8,358	December	3,674

Production by Districts and Coke Furnaces in Blast

Furnaces	Production (Gross Tons) December (31 Days)	Production (Gross Tons) November (30 Days)	January 1 Number in Blast	January 1 Operating Rate, Tons a Day	December 1 Number in Blast	December 1 Operating Rate, Tons a Day
New York:						
Buffalo	76,384	76,608	5	2,465	5	2,080
Other New York and Mass.	14,866	14,368	2	480	2	480
Pennsylvania:						
Lehigh Valley	25,238	24,604	2	815	2	820
Schuylkill Valley	23,649	22,332	2	765	2	745
Susquehanna and Lebanon Valleys	11,072	5,986	1	355	1	350
Ferromanganese	2,295	2,613	1	75	1	85
Pittsburgh District	229,320	221,515	10	5,660	14	7,415
Ferro. and Spiegel	3,494	4,410	1	115	1	145
Shenango Valley	15,577	16,360	1	500	1	545
Western Pennsylvania	30,309	15,572	2	980	1	445
Ferro. and Spiegel	1,358	7,501	0	....	1	250
Maryland	53,191	46,281	3	1,715	3	1,540
Wheeling District	67,650	84,564	3	2,035	3	1,865
Ohio:						
Mahoning Valley	106,495	72,274	6	3,210	4	1,965
Central and Northern	126,112	111,600	8	4,070	8	3,610
Southern	33,968	32,889	3	715	4	1,095
Illinois and Indiana	168,218	176,047	9	5,295	10	5,870
Mich., Wis. and Minn	35,504	33,010	3	1,145	3	1,235
Colo., Mo. and Utah	17,014	16,465	2	550	2	550
The South:						
Virginia	....	....	0	....	0	....
Kentucky	13,326	12,594	1	430	1	420
Alabama	124,756	84,646	9	4,055	7	2,900
Ferromanganese	2,283	....	1	75	0	....
Tennessee	....	....	0	....	0	....
Total	1,182,079	1,085,239	75	35,505	76	34,410

To Discuss Weathering of Metals and Coatings

THE 1934 regional meeting of the American Society for Testing Materials, including the group meetings of many of its committees, will be held at Washington in the week of March 5 in the Wardman Park Hotel. A feature of the meeting will be a symposium on the outdoor weathering of metals and metallic coatings. The preliminary list of papers is as follows:

Outdoor Test Results on Bare and Metal-Coated Ferrous Specimens, by C. D. Hocker, chemical engineer, Bell Telephone Laboratories, Inc., New York.

How Soon Is it Safe to Draw Conclusions?—A Discussion of the Early Interpretation of Test Results in the Atmospheric Corrosion of Non-Ferrous Metals and Alloys, by W. H. Finkeldey, Singmaster & Breyer, New York.

Galvanic Corrosion by Contact of Dissimilar Metals, by C. L. Hippensteel, Bell Telephone Laboratories.

Harmony of Outdoor Weathering Tests, by R. F. Passano, American Rolling Mill Co.

November Steel Exports Lower—Imports Drop Sharply

Exports of Iron Steel from the United States

(In Gross Tons)

	November		Eleven Months Ended November	
	1933	1932	1933	1932
Pig iron	42	160	2,306	2,253
Ferromanganese	6	....	39	28
Scrap	85,603	29,184	680,366	197,350
Pig iron, ferroalloys and scrap	*85,651*	*29,344*	*682,711*	*199,631*
Ingots, blooms, billets, sheet bar	112	31	3,009	1,620
Skelp	4,724	4,068	22,728	25,298
Wire rods	2,062	472	13,667	13,710
Semi-finished steel	*6,898*	*4,571*	*39,404*	*40,628*
Steel bars	1,944	1,106	19,156	13,939
Alloy steel bars	134	107	1,354	1,547
Iron bars	130	24	571	587
Plates, iron and steel	1,967	1,009	11,721	10,387
Sheets, galvanized steel	3,177	1,408	45,663	24,001
Sheets, galvanized iron	93	121	1,000	1,324
Sheets, black steel	4,859	2,929	32,918	35,971
Sheets, black iron	512	128	2,539	2,386
Hoops, bands, strip steel	1,974	1,276	18,381	16,886
Tin plate; terne plate	15,647	2,275	76,267	35,485
Structural shapes, plain material	998	1,014	13,155	14,248
Structural material, fabricated	1,520	1,312	13,914	15,406
Tanks, steel	221	597	2,391	2,688
Steel rails	7,472	500	32,778	10,983
Rail fastenings, switches, frogs, etc	3,437	257	9,405	3,606
Boiler tubes	299	450	3,586	3,381
Casing and oil-line pipe	4,569	1,346	34,946	17,371
Pipe, black and galvanized, welded steel	3,356	1,772	30,316	24,898
Pipe, black and galvanized, welded iron	147	355	1,332	3,581
Plain wire	2,870	404	18,594	7,660
Barbed wire and woven wire fencing	3,173	904	26,360	16,484
Wire cloth and screening	36	51	624	592
Wire rope	372	107	1,983	1,452
Wire nails	984	711	9,136	6,851
Other nails and tacks	294	249	3,593	3,067
Horseshoes	25	18	140	98
Bolts, nuts, rivets and washers, except track	357	206	3,245	2,407
Rolled and finished steel	*60,567*	*20,636*	*415,138*	*277,286*
Cast iron pipe and fittings	1,265	283	11,119	7,937
Malleable iron screwed fittings	219	119	2,263	1,541
Car wheels and axles	1,208	257	4,461	2,641
Iron castings	969	370	3,638	2,833
Steel castings	224	42	885	1,104
Forgings	246	170	2,825	3,463
Castings and forgings	*4,131*	*1,241*	*25,191*	*19,519*
All other	353	229	3,663	3,449
Total	157,600	56,021	1,166,107	540,513

Imports of Iron and Steel Products into the United States

(In Gross Tons)

	November		Eleven Months Ended November	
	1933	1932	1933	1932
Pig iron	4,079	8,776	43,099	116,386
Sponge iron	....	5	619	163
Ferromanganese and spiegeleisen*	9,791	3,326	55,217	21,755
Ferrochrome†	....	18	24	168
Ferrosilicon‡	310	....	813	48
Other ferroalloys	....	....	102	673
Scrap	2,935	87	56,644	9,775
Pig iron, ferroalloys and scrap	*17,115*	*12,212*	*256,518*	*148,968*
Steel ingots, blooms, etc	69	94	938	2,309
Wire rods	778	935	12,198	6,785
Semi-finished steel	*847*	*1,029*	*13,136*	*9,094*
Concrete reinforcement bars	479	1,474	2,517	26,272
Hollow steel bars	118	103	868	826
Merchant steel bars	2,026	3,150	18,762	29,391
Iron bars	93	9	439	436
Iron slabs	....	7	1	18
Boiler and other plate	43	10	234	418
Sheets, skelp, and saw plate	682	3,693	8,577	20,568
Tin plate	....	21	232	7,246
Structural shapes	2,164	5,655	26,806	32,379
Sheet piling	....	....	166	1
Rails and rail fastenings	981	383	6,301	5,418
Welded pipe	150	434	3,889	4,097
Other pipe	278	89	2,008	2,352
Barbed wire	389	1,876	6,916	14,020
Round iron and steel wire	458	102	2,954	1,778
Flat wire and strip steel	150	131	1,192	1,399
Wire rope and strand	163	148	1,471	1,658
Other wire	125	243	1,503	1,089
Hoops and bands	1,682	2,741	20,029	30,203
Nails, tacks, and staples	651	1,199	6,145	9,823
Bolts, nuts, and rivets	26	33	249	222
Other finished steel	20	24	370	150
Rolled and finished steel	*10,678*	*21,525*	*111,629*	*189,764*
Cast iron pipe and fittings	186	50	910	249
Castings and forgings	153	108	1,287	949
Total	28,979	34,924	383,480	349,024

*Manganese content only.
†Chromium content only.
‡Silicon content only.

WASHINGTON, Jan. 9.—November exports of iron and steel products, at 157,600 tons, were slightly lower than the 164,755 tons reported in the previous month but almost three times as large as November, 1932, when 56,021 tons was sent out of the country. As in recent months, scrap accounted for more than half of the November total, exports of this commodity having amounted to 85,605 tons, as compared with 81,176 tons in the preceding month and with 29,184 tons in November, 1932.

Iron and steel exports in the first 11 months of 1933 totaled 1,166,107 tons, of which 680,366 tons was scrap. In the corresponding 1932 period 540,513 tons of iron and steel was exported, including only 199,631 tons of scrap.

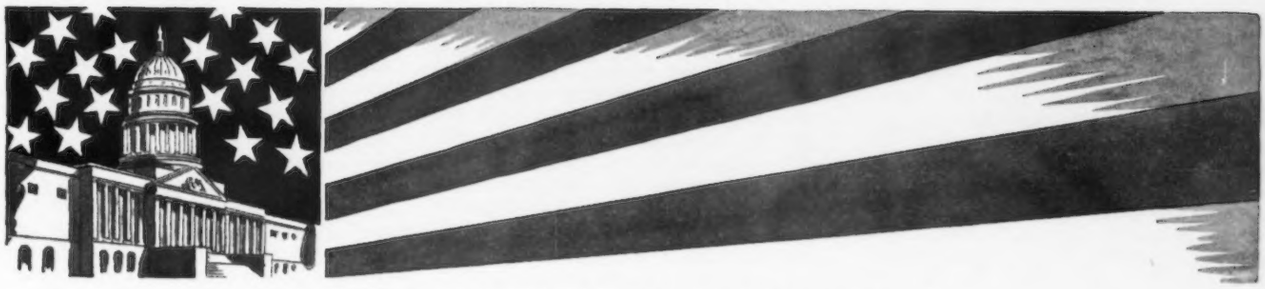
Totaling only 28,979 gross tons imports of iron and steel products into the United States in November were 17,694 tons or 38 per cent smaller than in the preceding month, when they totaled 34,924 tons. Ferromanganese alone registered a material gain, climbing 4361 tons to 9791 tons. Pig iron showed the sharpest single decline, dropping 15,666 tons to only 4079 tons, an unusually low figure for this trade.

Imports of iron and steel products during 11 months of 1933 have totaled 383,480 tons or 34,456 tons more than was received during the first 11 months of 1932 when 349,024 tons of these goods came into the United States. Pig iron has been the leading product in this trade, the total of 143,099 tons constituting 37½ per cent of the whole movement. Other leading products on the basis of quantity imported have been scrap, ferromanganese and spiegeleisen, and structural shapes.

United States Imports of Pig Iron by Countries of Shipment

(In Gross Tons)

	November		Eleven Months Ended November	
	1933	1932	1933	1932
United Kingdom	....	1,075	5,395	17,517
British India	3,447	984	61,100	27,235
Germany	....	36	234	361
Netherlands	151	6,485	58,165	67,733
Canada	360	101	11,492	2,113
France	....	....	....	....
Belgium	....	....	....	200
Norway	3	36	806	138
Sweden	....	....	3,205	447
All others	118	59	2,702	642
Total	4,079	8,776	143,099	116,386



THIS WEEK IN WASHINGTON

Labor Board Jurisdiction Again Challenged

Steel Corporation Refuses To Accept Power of Board To Force Recognition of United Mine Workers

By L. W. MOFFETT
Washington Editor, THE IRON AGE

WASHINGTON, Jan. 9.—Challenging the jurisdiction of the National Labor Board to make steel company coal mine operators sign a contract with the United Mine Workers of America, Nathan L. Miller, counsel for the United States Steel Corporation, at hearings before the board last week, pointed out that its subsidiary, the H. C. Frick Coke Co., is not extending and does not intend to extend recognition, if it means making a union contract. Mr. Miller told the board that the company recognizes that John L. Lewis, international president, and Philip Murray, vice-president, are officers of the United Mine Workers and that it has always made it plain that it would not contract with anybody but its employees, and would not arbitrate the question of a union contract with the board. The question of with whom the company shall contract, he declared, is not part of the agreement with the President and therefore is not referable to the board.

The hearings were held in connection with the dispute between the Frick company and its representatives recently elected at its coal mines under the supervision of the National Labor Board. They were continued when like disputes involving mines owned by other steel companies and other operators were heard.

Fail to Negotiate

The hearings grew out of failure to negotiate for an agreement between the owners of the mines and the representatives of the workers. The agreement made by the owners and the United Mine Workers with President Roosevelt on Oct. 30 provided that in case of failure of negotiations the matter would be referred to the National Labor Board. Elections under the supervision of the board were held in 29 mines in Pennsylvania in November for the purpose of choosing at each mine representatives of the employees with whom, under the President's agreement, the operators agreed to negotiate to a conclusion a form of agreement to contain "terms and conditions at least as favorable as the Appalachian agreement." It was agreed further that if no agreement with the majority representatives was reached in 10 days, the controversy would be immediately submitted by both parties to the board for decision and that both parties would abide by the decision.

The point at issue is whether there is to be an agreement between the operators and officers of the United Mine Workers as individuals or representatives of the United Mine Workers. The United Mine Workers are insisting upon recognition of their union. The operators at the series of hearings have unanimously declined to grant such recognition. Under the operators' proposed agreement mine committees would be selected at each mine by the elected representative. The representatives elected at each mine by the members of United Mine Workers are their international and district officers, none of whom is an employee of any mine. The United Mine Workers object on the ground that it would require that these international or district officers act as the mine committee in adjusting every dispute in each mine.

On the question of the check-off, the operators' proposed agreement would recognize voluntary orders for payment of dues out of miners' wages. The United Mine Workers insist that the check-off be made compulsory as it is in the Appalachian and other agreements.

Many Companies Involved

Present at the Frick mine hearings were Mr. Miller, President W. A. Irvin, president United States Steel Corpn., Thomas Moses, president of the Frick company and Messrs. Lewis and Murray, as representatives chosen at the elections. In the absence of Senator Robert F. Wagner, chairman of the labor board, William Green, president of the American Federation of Labor and a member of the board, presided. Hearings covered mines of the following companies: Inland Collieries Co., Consumers Mining Co., Republic Steel Corpn., National Mining Co., Crucible Fuel Co., Vesta Coal Co., Allegheny Coal & Coke Co., Sharon Limestone Co., Pickands, Mather & Co., Shannon Coal Co., and Weirton Coal Co.

Negotiations Outlined

Mr. Murray reviewed negotiations beginning last September, when he wrote to Steel Corporation subsidiary proposing an agreement, and received a counter-proposal. Differences developed over the form of recognition, the check-off and the designation of mine committees. Subsequently the case was taken up with President Roosevelt and General Hugh S. Johnson.

Mr. Murray laid particular emphasis on the fact that the President in approving the agreement on Sept. 21 added the notation that the hours, wages and conditions at the steel company mines were to be made "as favorable as at the other bituminous mines." He said that the question of union recognition was raised from the start when it "did not seem to be granted by Mr. Moses' letter to the United Mine Workers," Mr. Murray telephoned General Johnson. The latter wired him on Oct. 2 that it was his understanding that the letter of Mr. Moses in behalf of the captive mine owners was an acceptance of the provisions of the agreement between other operators and the United Mine Workers, including the check-off and check-weighmen. On this basis, Mr. Murray said he undertook conferences "for real collective bargaining contemplating contracts." Subsequently, he pointed out, "disagreements seemed to arise between General Johnson and the captive mine owners with the result that the destructive strike in the region continued."

In this connection, the board asked General Johnson for his recollection as to the agreement between President Roosevelt and the operators. He said that it was a difficult question "because there were so many agreements back and forth." His impression, however, is that the owners were "to contract with whomever the representatives happened to be."

Union Contract Fundamental

Mr. Miller told the board the matter of making a union contract was a fundamental question that gets back to the open or closed shop. He pointed out that there was no difficulty about negotiating with Mr. Lewis and Mr. Murray in the mines where they had been elected.

"If it had been made a company affair," said Mr. Miller, "as the majority of Frick mines voted for other representatives than the United Mine Workers, these gentlemen would not have been here." Because the negotiations were by mines, he said, Mr. Murray had been put to the inconvenience of going around to each of the mines, which Mr. Miller considered unnecessary.

On the check-off, Mr. Miller said that General Johnson did telegraph that the agreement included such a provision but, he declared, Donald R. Richberg, general counsel for the NRA, who drafted part of the agreement, explained to them that it included check-weighmen but not the check-off.

"When General Johnson learned of that," said Mr. Miller, "he said it left him out on a limb, that he was wrong in his telegram, that we were right and that the Government must be bound by its own general counsel," said Mr. Miller. Despite this, he added, the company was willing to grant a voluntary check-off.

Mr. Miller insisted, however, that "the question of with whom we shall contract is not a part of the agreement with the President and, therefore, is not referable to this board. At the outset of the hearing, Mr. Miller had said that the Frick company representatives appeared before the board out of courtesy, having no knowledge of a controversy that was referable to the board.

He declared that the Frick company had no concern over that part of the agreement relating to lower wages paid by some other company.

"Our standard has always been as high or higher than the best," he said, "and if another operator makes a lower standard it is no concern of ours; we shall not change our standard."

Distinctions on Negotiations

Distinction was made between the representatives of the United Mine Workers as officials of that union and as representatives of employees. In reply to a question, Mr. Miller asked: "How can an association negotiate? Only individuals can. Even if incorporated the situation would be the same; it is merely a legal fiction. Of course a corporation can make contracts, but the draftsmen of the NIRA had in mind, I am sure, individuals." He said the company will negotiate over wages, hours and other working conditions, "but with individuals." This is the position, he said, the company took in its letter of Oct. 30 to the President and it was declared that the President accepted the proposal.

Mr. Green asked what difference there was between check-off for paying a check-weighman and a check-off for union dues, declaring both were "working conditions."

Mr. Miller replied that the company took the Richberg interpretation that provisions for a check-weighman were part of "working conditions" but that provisions for union dues were not. He added that the President at one time took the interpretation that the check-off for dues was part of working conditions, "but we controverted him" previous to the Oct. 30 agreement.

By the terms of that agreement, Mr. Miller said, negotiations were to be undertaken and the only things that might be subsequently referred to the National Labor Board were "the terms and conditions" of labor which were to be "as favorable" as under other coal agreements.

Refuse To Make Union Contract

"General Johnson and the President will tell you," said Mr. Miller, "that we told them from the start that we would not make a union contract and we would not arbitrate that question. That was what we were making our whole fight on." He said the company would grant all "terms and conditions" but would never submit to the board the question of making a union contract. "On that we would have to challenge the jurisdiction of this Board," said Mr. Miller. He maintained that the company is obligated to negotiate with both the majority and any "substantial minority."

Mr. Lewis said that if the total vote at all the mines owned by the United States Steel Corpn. were counted as one, it would show the United Mine Workers won by a substantial majority. Mr. Miller agreed but said the Frick company result was different. Mr. Lewis based the Mine Workers' case on the Presidential agreement of Oct. 30 which, he said, meant that the National Labor Board was to assume unrestricted jurisdiction.

"I, as one of the conferees," said Mr. Lewis, "understood and was given to understand by General Johnson and Mr. Richberg that the National Labor Board would have jurisdiction in case of disagreement in negotiating. It is a late day for the Steel Corporation to say it will not accept the board's arbitration. It is for the board to determine whether this Presidential agreement does not leave to this board every matter of controversy."

Illinois Mines Concerned

As to "principle" in recognition, Mr. Lewis said he saw none because the Steel Corporation's mines in Illinois were operated under contract with the United Mine Workers. He declared that the only means of policing the coal industry in order to maintain code conditions was by the United Mine Workers. Inquiry was made as to why the Steel Corporation should escape such policing and not maintain code conditions.

Mr. Miller emphasized that the Oct. 30 agreement was made with the President and that signing a union contract and arbitration by the National Labor Board were outside the agreement. "I do challenge the board to hold that we would do what we said we would not do," said Mr. Miller.

He declared that it was a matter of the principle of the open versus the closed shop and that "every one knows where the United States Steel Corpn. stands on that." The Steel Corporation, he said, signed United Mine Worker contracts in Illinois "solely because no non-union miner in that state could get a miner's license."

Both Mr. Murray and Mr. Lewis denied that they had ever asked for a closed shop, citing the fact that certain United Mine Worker contract mines had non-union miners. Mr. Lewis said that when left free from company union interference, they join the United Mine Workers. He inquired if the National Labor Board should ask the President concerning his understanding of the board's jurisdiction under the Oct. 30 agreement whether Mr. Miller would accept his conclusion. Mr. Miller stated

that he was willing only that the board should ask the President to confirm his statement that they had never consented to have the board say with whom they should sign a contract.

Replying to Mr. Miller's statement that the position of the Steel Corporation was well known, Mr. Lewis said he assumed that it would yield the same as it did on the check-off, "that is, under pressure." Mr. Miller denied this and demurred taking the board's interpretation of what the Oct. 30 agreement meant.

Mr. Miller was asked if his company would refrain from discriminating against men for joining a union. He replied that to discriminate against union men would be in violation of the law, "assuming that the recovery act is law."

Hearings Attract Wide Attention

The hearings have attracted much attention in industry generally, and especially in the steel industry. It is contended that they do not involve simply the unionization of "captive" coal mines, but reflect a movement on the part of organized labor to spread further to other industries its unionization movement, with particular and immediate effort directed toward the steel industry. The question of jurisdiction of the board likewise is a matter that has created much interest. It is believed a decision in the coal cases will be handed down soon but this does not signify that the end of the proceedings is in sight inasmuch as court action may follow to determine the power of the board.

Meanwhile Senator Wagner is expected soon to introduce legislation he is working on to revise the labor section of the recovery act and to strengthen the power of the National Labor Board.

He shares with organized labor the belief that shorter working hours are necessary, but instead of proposing them through legislation, already under way in the new Congress, the New York Senator thinks the reductions should be made by code authorities and administrators. He said that, while favoring a reduction of hours, he does not want to see an inflexible rule. He did not indicate whether he would support the move again started by organized labor for the 30-hr. week, but it is clear that the legislation, if it comes to a vote, will receive strong support in both branches of Congress. It is seriously doubted, however, if the support will be sufficient for passage of the legislation. Chairman Connery of the House Committee on Labor is strongly urging the legislation, which is similar to that he sponsored unsuccessfully at the previous session.

Independents' Mines Also Involved

Present at the hearings yesterday were William D. Evans, Vesta Coal Co. and Shannopin Coal Co.; F. B. Hufnagel, Crucible Fuel Co.; O. G. Leichliter, Weirton Coal Co.; R. G. Bostwick, Thorp, Bostwick, Stewart & Reed, attorney for Weirton Coal Co., and Consumers' Mining Co.; William W. Holloway, Wheeling Steel Corpn.; George M. Laughlin, chairman, and George Gordon Crawford, president, Jones & Laughlin Steel Corpn.; Parker Wilson, Wheeling Steel Corpn., and Consumers' Mining Co.; M. C. Anglo, president, Vesta Coal Co.; T. M. Girdler, chairman; R. J. Wysor, vice-president; Thomas Veach and John Hill, counsel; Edward Winning, mine manager, and W. P. Belden, Republic Steel Corpn.

Mr. Evans, whose companies are subsidiaries of the Jones & Laughlin Steel Corpn., said that all of the captive mines considered that Mr. Miller was the best qualified spokesman, since he had been a party to all conferences and agreements. He declared the captive mine operators stood on what Mr. Miller had told the board. In the opinion of Mr. Evans only two questions remain: First, with whom to contract; second, the check-off. Both of these, he said, had been settled by agreement with the President.

To Preserve Right of Contract

"We are asking for no privileges; we want only to maintain our constitutional right of liberty of contract," said Mr. Evans. He declared the operators had fulfilled every provision of the agreement with the President and that it "in no way provides for a contract with the United Mine Workers." Like Mr. Miller, he said there was no question referable to the Labor Board.

Mr. Green asked how the captive mine owners interpreted the following provision in the Presidential agreement: "If no agreement with the majority representatives is reached in 10 days, the controversy will be immediately submitted by both parties to the National Labor Board for decision and both parties will agree to abide by that decision."

Mr. Evans said that the provision referred only to hours, wages and conditions.

Mr. Green inquired if it were not true that the whole proceeding had been taken under Section 7-a of the Recovery Act, with miners voting for officers of the United Mine Workers to represent them, negotiations of questions in dispute left to the National Labor Board, all in accord with the "plain, simple language of the Oct. 30 agreement."

Mr. Evans replied that was the fundamental ground of difference.

"It is as far from electing the United Mine Workers to represent our employees as choosing the king of England," he said.

Will Not Recognize U. M. W.

Upon being asked by Mr. Green if Mr. Lewis and Mr. Murray were not elected "because they were officers of the United Mine Workers," Mr. Evans said that made no difference.

"We grant they control our miners," he continued. "We knew beforehand the majority would vote as they did because we knew they were members of the United Mine Workers. Then why should we be making any fight except that it was on the ground that we would recognize no union but would deal only with Lewis and Murray as individuals who happen to be officers of the United Mine Workers? We will not put down in any contract that the party of the first part is the United Mine Workers."

Father Haas, a member of the board, asked if it were not all a matter of words. Mr. Evans replied that "as Governor Miller answered that, so must I. You may regard it as words, but it means the open or closed shop and, as Governor Miller said, that is vital. One form of contract results in the closed shop; the other allows the management to select its own workers. Since 1927 we have refused to contract with the United Mine Workers. At Shannopin, 90 per cent of the miners didn't want the United Mine Workers, but after NRA that changed, though there is still a minority outside the United Mine Workers whose rights we must protect. We will negotiate with them."

Mr. Belden said that the difference between the two forms of contracts had been very clearly stated by President Lewis of the United Mine Workers who at last Thursday's hearing stated "that the contract if made with Murray as an individual could not be enforced by Murray except through the organization and influence of the United Mine Workers. Lewis had also asked what right had the United Mine Workers to disburse moneys to fulfill a contract made by the captive mine owners with Murray as an individual. Mr. Belden said that a compulsory check-off violated Section 7-a of the Recovery Act.

Father Haas asked as to the real difference between a formal contract between the United Mine Workers and the companies, and that proposed by the companies.

"Our contract would require that the representatives of our own men deal with the problems of that particular group," Mr. Belden replied, "while under the U. M. W. contract representatives of the workers would approach problems in a spirit of welfare for members spread over other mines."

Mr. Girdler said that "the individuals represent your men, while the United Mine Workers' representatives are dealing for the union." He said the question of dues was also involved, asserting that "in my 32 years of experience, I have never found a man who had paid dues because he wanted to, but because he was forced to do so by the union." He declared he had never seen "one per cent of the coercion exerted on the part of steel companies as that exercised by professional labor leaders."

Pennsylvania Loan Application Goes to I.C.C.—Report Made on Car Inspection

WASHINGTON, Jan. 9.—Formal application has been made to the Interstate Commerce Commission by the Pennsylvania railroad for authority to borrow $77,000,000 from the PWA to be used in completing electrification between Wilmington, Del., and Washington, and to purchase 7000 freight cars and 101 electric locomotives. All of the freight cars are to be built in the carrier's own shops while it will build 76 electric locomotives in its own shops and have 25 built in outside shops. The PWA and the Pennsylvania on Dec. 29 negotiated a contract for the loan.

The electrification work will cost approximately $45,000,000, the new freight cars $17,000,000 and the locomotives $15,000,000. The rolling stock will consist of 5500 box and 1500 flat cars, and 28 passenger, 59 freight and 14 switching locomotives will be built. Outside shops will build 11 passenger and 14 switching locomotives. Of the freight cars to be built, 3500 will be equipped with automobile loaders.

The Pennsylvania will tear down 500 old box cars, to be replaced by a like number of new automobile cars. The 1500 all-steel flat cars will be of 70-ton capacity for accommodating the longer lengths of steel shapes, plates and pipe. They will replace old cars. There will be 3000 box cars of increased dimension available for conversion into automobile carrying cars and to be use also in moving heavy commodities. They will replace an equal number of steel underframe wooden superstructure cars. Two thousand all-steel standard box cars to replace an equal number of steel underframe, wooden superstructure cars will also be built.

The electrification improvements, estimated to cost $45,130,000, call for an outlay of $40,130,000 in 1934 and $5,000,000 in 1935. The work of building the locomotives and cars will begin at once, according to a statement by the PWA. Of the electrification expenditures, $18,990,000 will go for electrification equipment and material to be spent in 1934 and $360,000 in 1935. Other expenditures include $4,520,000 in 1934 and $980,000 in 1935 for telegraph and signal system; $2,380,000 to be expended in 1934 for clearances, etc.; $8,470,000 to be spent in 1934 for electrification-labor and supervision-roadside installation, the remaining amount of this work, $1,960,000, to be spent in 1935; $3,780,000 will be spent in 1934 and $1,000,000 in 1935 for engineering and superintendence; $800,000 will be expended in 1934 for direct cost of handling materials and $1,190,000 will be spent in 1934 and $700,000 in 1935 for work trains and division expenses. The electrification improvements will involve the electrification of 646 additional track miles, the construction of 16 new substations and the installation of additional apparatus in 18 existing substations.

Erie and L. V. Loans Approved

The I.C.C. has approved a loan of $11,845,750 to the Erie railroad to purchase 3775 freight cars and 128 passenger and mail coaches. Simultaneously, the commission granted approval of a PWA loan of $2,199,999 to the Lehigh Valley railroad to repair 60 locomotives and 1000 steel hopper coal cars and to rebuild 1000 steel underframe box cars.

The freight cars to be purchased by the Erie to cost $9,057,250 are as follows: 2500 50-ton, self-cleaning hopper; 500 50-ton, plain box; 500 40-ft., 40-ton, automobile; 100 50-ft., furniture; 50 covered hopper and 125 50-ft., 70-ton flat. The passenger units to be purchased to cost $2,788,500, include 50 all-steel semi-through coaches; 75 all-steel suburban coaches, and eight mail coaches.

I.C.C. Reports on Car Inspection

A detailed inspection of freight cars and locomotives, recently completed by the bureaus of safety and locomotive inspection of the Interstate Commerce Commission, made at the request of the Federal Coordinator of Transportation, revealed that neither the fears of a freight car shortage nor the optimism of those who relied upon railroad reports of surplus equipment were fully justified. Had the anticipated increase in fall business been realized, it is probable that the supply of serviceable cars would have been fully absorbed, although the surplus was apparently sufficient, at least numerically, to have averted a serious shortage.

The railroads whose cars were examined reported 118,854 stored cars fit for the transportation of all commodities for which designed. The inspection developed that 55.5 per cent of these cars were fit for the service for which they were designed, and 4.4 per cent were found unfit for any service until given repairs estimated to cost $350 per car. The balance, comprising 40.1 per cent of the stored cars, were suitable for the transportation of certain commodities only. A further analysis of the reports shows that 56 per cent of the cars inspected were constructed prior to the year 1920. The cars covered by this survey did not include cars definitely classed as "bad order."

The check of locomotive condition was somewhat less assuring than that of freight cars. The railroads reported 5549 locomotives stored in serviceable condition, of which 4162 were inspected. Of those inspected, 3275, or 78.7 per cent, were actually ready for service, while 887, or 21.3 per cent, were in need of repairs requiring three days or more time and the expenditure of $150 or more. The locomotives were further classified as to type, age and tractive power. It was found that a substantial number of the stored locomotives were of types designed for switching and passenger service, and those whose wheel arrangement and tractive power would indicate their use for branch line and secondary service.

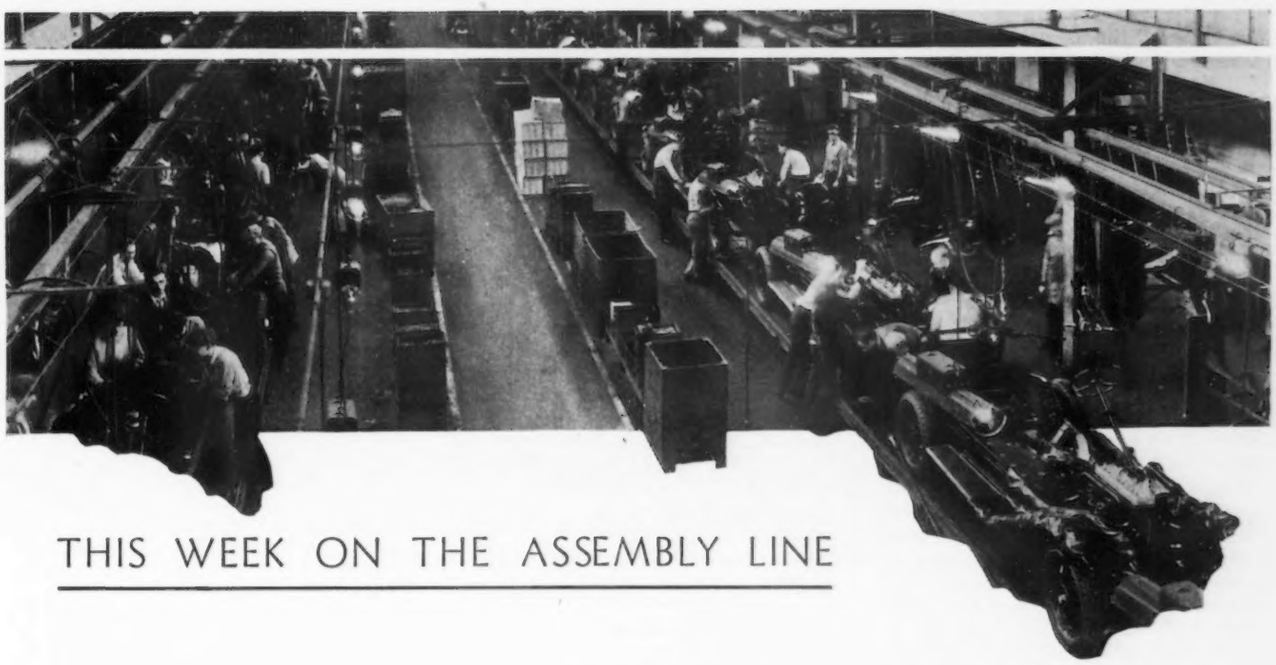
Locomotives built prior to 1910 constitute 41.9 per cent of the stored power inspected, while an additional 39 per cent range from 13 to 23 years of age, leaving but 19.1 per cent less than 13 years old. From the standpoint of tractive power, the adequacy of the locomotive reserve is still further out of proportion to the numerical ratio of stored locomotives to total owned. Of the units reported by the railroads as "stored serviceable" 41.5 per cent have tractive power less than 40,000 lb., while 62.5 per cent rate less than 50,000 lb.

The locomotives under consideration do not include those definitely reported in car service division bulletins as in "bad order" or awaiting shop for classified repairs.

Allotments totaling $11,400,000 for the construction of 62 more non-federal projects have been announced by the Public Works Administration, bringing the total non-federal list to 1707 projects, representing allotments of $774,416,894. Included in new allotments were $2,000,000, loan and grant, for construction of two fireproof school buildings at Boston; $1,600,000, loan, to Hueneme Dock Corpn., private organization to be formed, for harbor and terminal development at Hueneme, Cal.; $950,000, loan and grant, to the city and county of Denver, Colo., for improvements to waterworks system; $800,000, loan and grant, for improvements at Queens General Hospital, New York; $756,000, loan and grant, for construction of intercepting sewer and sewage disposal plant at Racine, Wis.; $420,000 and $315,000, loans and grants, former for extension to existing sanitary sewer system and latter for construction of storm water sewers at Phoenix, Ariz.; $515,000, loan and grant, for construction of concrete highway bridge at Rochester, N. Y., and $550,000, loan and grant, for construction of high school at Huntington, N. Y.

S.K.F. Industries to Move on Jan. 11

S.K.F. Industries will move their Hartford works to Philadelphia on Jan. 11. Operations will be under way about a week later in the former plant of the Hess-Bright Co., at Front St. and Erie Ave.



THIS WEEK ON THE ASSEMBLY LINE

Production Delays Are Likely to Hold January Output to 125,000 Units

NEW YORK, Jan. 9.

THE opening of the New York automobile show, usually a happy event for the motor car industry, finds most of the industry in anything but a happy frame of mind. Notwithstanding confident statements to the public about expanding output, production of leading companies aside from Ford is still in a bog from which manufacturing executives are frantically trying to pull it.

Chevrolet is perhaps the outstanding example of how delays have thrown its announcement program out of gear. It originally planned to show its 1934 car in December, the date gradually being shoved farther back until it became evident that dealers would not have enough cars on hand for adequate displays by the opening of the New York show. Moving swiftly to meet the emergency, Chevrolet arranged for special exhibitions in 100 American cities and assembled about 1000 units at its Flint plant.

This means that no Chevrolet dealer yet has a car which he can truly call his own and that each of the 100 shows does not have more than an average of 10 cars to display. It is understood that no Chevrolet branch assembly plant, of which there are seven, is in operation. The only cars coming off the line today are at the Flint plant. Although delays in securing dies are said to have contributed to some of Chevrolet's early difficulties, the trouble now centers mainly in the manufacture of the new front-end units.

"Knee-Action Wheels" Slow Down Production

Whatever else may be said about "knee action wheels," the fact remains that their design is exceedingly complicated and they must be made to rigid specifications. Chevrolet is understood to be insistent upon every unit produced being fool proof so that there will be no failures or trouble in service. This sound rule has slowed down operations. The story is that almost every high General Motors official who has anything to do with car manufacturing activities has at one time or another been at Chevrolet's Detroit plant in connection with the delay in obtaining front-end units.

In an attempt to get off "dead center," Chevrolet is reported to have offered a Detroit wheel company a contract to make half of its 1934 requirements of the welded steel housings in which the coil springs are enclosed. It is assumed that the other half would be made by the Chevrolet company.

Chevrolet probably is not in as tight a predicament as its companion General Motors division, Oldsmobile. Having announced its new low-price six and having made enough cars by hand for the national shows, it has not completed its tool and die program and has not even bought steel for its first run of cars. It appears certain that it will be well into February before this division is squared away for volume production.

Pontiac Making Little Progress

Pontiac, dependent on Chevrolet for its front-end units, is making painfully slow progress. Although it announced its new car on Saturday, its dealers will not have stocks for display purposes until Jan. 13 and even then they will be few in number. Cadillac-LaSalle is going ahead slowly. Buick is the only General Motors division which apparently has mastered its production problems, but its output also is not so large as anticipated.

Admittedly it is early to judge January's assemblies, but unless General Motors works itself out of a jam faster than now seems possible its output this month will be little more than half of its original schedule of over 100,000 units. Chevrolet alone, it is understood, will do well to turn out 40,000 cars instead of a desired 75,000.

Chrysler is in a like predicament. Plymouth and Dodge have each manufactured a few cars, but not on a quantity basis. Production in these two divisions is such an uncertain factor that it is said that the operating officials themselves do not yet know how many cars they can make this month. It is scarcely a secret that neither a DeSoto nor a Chrysler

has come off the assembly line at the Jefferson Avenue plant, Detroit.

Ford Turning Out 2300 Cars a Day

Hudson-Terraplane, like the larger companies, has been seriously affected by production delays. Meanwhile Ford is operating at a rate of 2300 cars a day, five days a week, and has announced that this schedule will be maintained throughout January. The tentative program for February is reported to call for at least 75,000 units. It is estimated that by the time that Chevrolet and Plymouth get adequate stocks into dealers' hands Ford will have a two months' lead, which is no small handicap for these two companies to face.

The industry's production difficul ties, unless overcome sooner than expected, may cut the January volume down to 125,000 units, as compared with original plans for more than 200,000. This is not good news for the steel trade, which still looks for some moderate-sized releases this month, but also sees volume steel buying further postponed.

Ford's steel purchases late in December were the largest in several months. It is known that Ford has enough steel at Rouge for 100,000 of certain parts, one part to a car, but its total steel tonnage probably doesn't exceed 50,000 tons. It is possible that Ford will make a fair steel buy the final week of January.

Sizable Steel Releases Pending

For the first time in several years Fisher Body plants are reported in a position to produce bodies before General Motors divisions are ready for them. Sizable steel releases are pending from Fisher's Cleveland plant as well as from Fisher plants in southern Michigan. It is understood that Chevrolet's Flint plant has steel on hand for about 70,000 cars. Chevrolet has removed the last steel in storage at the Nicholson dock to its local gear and axle plant. This consisted mainly of forging stock and hot-rolled strip steel. Chrysler is not expected to place consequential steel orders until it has made approximately 40,000 cars.

Heavier Gage Sheets Used for Fenders

Motor car makers have had to go to heavier gage sheets to draw successfully their 1934 fenders. Pontiac is said to have tried 20-gage material 54 in. wide for its front fenders, but has found it necessary to specify 19 gage. Cadillac is using an 18-gage sheet for its fenders. The fender lines are so severe that it was found impractical to attempt making fenders from one piece of steel. It is believed that the final decision was to use three pieces of steel, which are welded together. Because of the wide sweep of fenders on this year's models, unusually wide sheets are being utilized.

"Production" Cars Conservative

At the local show, the line-up for 1934 varies according to style and mechanical classifications. In radical departure from the conventional in styling, DeSoto, Chrysler, Hupmobile, Cadillac and LaSalle stand out. De Soto and Chrysler have the nearest approach to streamlining from an engineering standpoint. Cadillac and La Salle, on the other hand, have emphasized the streamlining of individual parts, such as the radiator, lamps, fenders and door knobs. Hupmobile's series of large cars is about half way between the DeSoto and the LaSalle in styling. The "bread-and-butter" cars of the leading makers, such as Chevrolet, Pontiac, Plymouth and Dodge, are essentially conservative.

Industry Divided on Springing Methods

From a mechanical standpoint the industry readily divides into two parts—those cars with independent front wheel suspension and those with conventional springing. Numbered among those breaking with tradition are all General Motors cars, Plymouth, Dodge, Chrysler six, Hudson and Nash. Ford, Packard, Studebaker, Auburn, De Soto, Chrysler eight, and Hupmobile have made no changes in springing methods.

Introduction of "knee action wheels" has brought with it many serious problems. An entirely new tire with a special tread pattern has been developed—four tire makers cooperating in building a large doughnut tire with inflation pressures ranging from 21 to 25 lb. It was found that the corners of the tread must be rounded and the side wall ribbing radial rather than at an angle.

Knee action puts upon the frame a load formerly handled by the front axle. When the front of the car was made rigid, the weaving effect traveled along until it found a weak spot further back. On the Buick this was just back of the dash line, causing a bad body shake. To eliminate this effect, the frame was reinforced by fitting braces between the ends of the X-frame members and the side rails.

Coil Springs Needed Only in Front

W. J. Davidson, of General Motors, and F. A. Bower, Buick's chief engineer, believe that independent spring suspension is needed only in front, since the primary advantage of the construction is to permit a satisfactory means of reducing front spring rates. Already being low in rate, rear springs would not be benefited. Buick's experience indicates that coil springs have an extremely long life. To prevent surface flaws all stock is purchased centerless ground. After coiling, the spring is quenched in a semi-automatic machine which holds it to the correct height and keeps it square. It is claimed that no commercial spring maker was willing to work to the close specifications necessary in the manufacture of coil springs and consequently Buick had to develop the material in its own plant.

In the preparation of tools and dies for its new small car, which it is said will be a straight eight on an 116-in. wheelbase to sell at a base price of about $750, Buick probably will fill up its own shop before letting work to outside firms. It is reported that Buick is so anxious to get production started on this job that it has attempted to put a penalty clause in machinery contracts for non-delivery of equipment by March 1, but such a provision is in violation of the machine tool code and no supplier will accept orders on that basis.

The new LaSalle, inserted in the middle of Buick's range with a base price of $1495, is said to have a wheelbase of 119-in. and is reported to be powered by a straight eight motor made by the Olds Motor Works and similar in design to that used in the Olds eight. Having had a V-eight motor as standard equipment for years, LaSalle is not advertising the fact that it has changed to a straight eight.

Steel Mills Benefit from 1934 Changes

Steel makers are not likely to suffer from the changes in 1934 cars. Practically without exception cars are longer and heavier with more room inside the bodies. Wheels are mostly of the steel artillery type. Chrysler-made cars, for example, are equipped with steel wheels as against demountable wood wheels in 1933. Frames are heavier. The new DeSoto is a relatively heavy car, weighing about 3700 lb. Even the smaller cars, such as Chevrolet, Plymouth and Ford, weigh 2500 lb. or more.

1934 Car Prices

Based on Coupe Model, F.O.B. Factory

Chevrolet Six (Standard)	$485
Plymouth Six (Standard)	495
Ford V-Eight (Standard)	515
Ford V-Eight (DeLuxe)	555
Chevrolet Six (Master)	565
Terraplane Six	565
Plymouth Six (DeLuxe)	575
Oldsmobile Six	640
Dodge Six	645
Pontiac Eight	695
Hudson Eight	695

Note—The new Airflow De Soto Six has a base price of $995, the Airflow Chrysler Eight $1,245, the Airflow Imperial Eight $1,495.

Production for Stock Sustains Steel Rate at 31 Per Cent

Digestion of Inventories May Cause Further Decline in Output, But Subsequent Rebound Promises to Be Sharp—Scrap Advances

STEEL demand has fallen off materially since the close of 1933. The recession was not unexpected, since the December rate of ingot output showed a contra-seasonal gain of 23 per cent over November. Current production, at 31 per cent, reflects no decline from the rate of a week ago, but operations are being sustained in part by the replenishment of mill stocks of raw and semi-finished steel and hence do not fully reflect the shrinkage in consumer demand.

How long it will take the trade to digest inventories built up in December is difficult to estimate. It is possible that a further decline in output will occur before improvement sets in again, although such a development may be forestalled by an expansion in the demand for sheets, strip and other products on which contract prices did not advance on Jan. 1.

AGAIN in automotive releases of flat rolled steel is already having a sustaining influence on operations in the Cleveland-Lorain district, where a three-point loss in production is expected to be recovered before the week-end. At Pittsburgh, a growth in miscellaneous orders for steel has raised the operating rate one point to 22 per cent.

The rise in small bookings, besides reflecting increased demand for sheets and strip, suggests that expansion of inventories in December was not universally practised. Certain companies chose to close the year in the orthodox manner so far as stocks are concerned. Others were deterred from accumulating material either because of inability to borrow or difficulty in forecasting their precise requirements.

Aside from these favorable influences, maturing public works projects are giving increasing support to the steel industry. Fabricating awards for the week, at 30,140 tons, are the largest since the middle of November. The outstanding letting was 11,660 tons for bridges across the Cape Code Canal at Bourne, Mass. An award of 11,000 tons for the Midtown post office, New York, is imminent.

WHATEVER the immediate course of steel output may prove to be, a marked rise is looked for before the end of the first quarter. By that time, it is believed, the industry will feel the combined effect of accumulating automotive and railroad demands.

The Missouri Pacific has distributed orders for 25,000 tons of rails and the Southern Pacific will soon take bids on 25,000 to 40,000 tons. The New York Central plans to buy 40,000 tons of rails and will take figures next week on its first quarter requirements in bars, plates, shapes, sheets, wire nails, billets and axles, amounting to more than 10,000 tons. The Pennsylvania will take figures shortly on 50,000 tons of plates, shapes, bars and sheets for 1500 flat and 3500 box cars, which it will construct in its own shops. Bids on the 12,000 cars to be bought by the Erie, Chesapeake & Ohio and Nickel Plate roads will be taken Jan. 15.

The full force of automotive demand for steel will not be felt until February, since difficulties in connection with front-end construction have further delayed production on new models. January output of cars, originally estimated at 200,000, may not exceed 125,000 units.

THE favorable character of the longer range outlook in steel is mirrored by scrap prices, which remain strong. THE IRON AGE composite for heavy melting steel has risen from $11.33 to $11.58 a ton, the seventh consecutive advance since it reached a second-half low of $9.83 in November, 1933.

A possible augury of a revival of the capital goods market is seen in the continued activity in machine tools. Following closely recent large purchases by the Citroen, Peugeot and Buick motor companies, a large new inquiry has been issued by the Buick company. Demand for machinery from non-automotive sources is also improving.

STEEL ingot production, besides rising one point to 22 per cent at Pittsburgh, has increased 15 points to 50 per cent in the Wheeling district and 18 points to 77 per cent at Detroit. In addition to the loss of three points to 47 per cent at Cleveland, there were recessions of two points to 32 per cent at Chicago, seven points to 22 per cent in the Philadelphia district, and 11 points to 30 per cent at Buffalo. The Valley rate is unchanged at 30 per cent and the Southern average at 50 per cent.

THE IRON AGE composite prices for finished steel and pig iron are unchanged at 2.028c. a lb. and $16.90 a ton respectively.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	Jan. 9, 1934	Jan. 2, 1934	Dec. 12, 1933	Jan. 10, 1933
Per Gross Ton:				
No. 2 fdy., Philadelphia	$19.26	$19.26	$19.26	$13.34
No. 2, Valley furnace	17.50	17.50	17.50	14.50
No. 2 Southern, Cin'ti	18.13	18.13	18.13	13.82
No. 2, Birmingham	13.50	13.50	13.50	11.00
No. 2 foundry, Chicago*	17.50	17.50	17.50	15.50
Basic, del'd eastern Pa	18.76	18.76	18.76	13.50
Basic, Valley furnace	17.00	17.00	17.00	13.50
Valley Bessemer, del'd P'gh	19.76	19.76	19.76	16.89
Malleable, Chicago*	17.50	17.50	17.50	15.50
Malleable, Valley	17.50	17.50	17.50	14.50
L. S. charcoal, Chicago	23.54	23.54	23.54	23.17
Ferromanganese, seab'd carlots	85.00	85.00	82.00	68.00

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$40.00
Light rails, Pittsburgh	32.00	32.00	32.00	30.00
Rerolling billets, Pittsburgh	26.00	26.00	26.00	26.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	26.00
Slabs, Pittsburgh	26.00	26.00	26.00	26.00
Forging billets, Pittsburgh	31.00	31.00	31.00	31.00
Wire rods, Pittsburgh	36.00	36.00	36.00	37.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb	1.60	1.60	1.60	1.60

Finished Steel

	Cents	Cents	Cents	Cents
Per Lb.:				
Bars, Pittsburgh	1.75	1.75	1.75	1.60
Bars, Chicago	1.80	1.80	1.80	1.70
Bars, Cleveland	1.80	1.80	1.80	1.65
Bars, New York	2.08	2.08	2.08	1.95
Plates, Pittsburgh	1.70	1.70	1.70	1.60
Plates, Chicago	1.75	1.75	1.75	1.70
Plates, New York	1.98	1.98	1.98	1.898
Structural shapes, Pittsburgh	1.70	1.70	1.70	1.60
Structural shapes, Chicago	1.75	1.75	1.75	1.70
Structural shapes, New York	1.95¼	1.95¼	1.95¼	1.86775
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	1.70
Hot-rolled strips, Pittsburgh	1.75	1.75	1.75	1.45
Cold-rolled strips, Pittsburgh	2.40	2.40	2.40	1.90

Finished Steel

	Jan. 9, 1934	Jan. 2, 1934	Dec. 12, 1933	Jan. 10, 1933
Per Lb.:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.25	2.25	2.25	2.00
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.35	2.35	2.35	2.10
Sheets, galv., No. 24, P'gh	2.85	2.85	2.85	2.75
Sheets, galv., No. 24, Chicago dist. mill	2.95	2.95	2.95	2.85
Hot-rolled sheets, No. 10, P'gh	1.75	1.75	1.75	1.45
Hot-rolled sheets, No. 10, Chicago dist. mill	1.85	1.85	1.85	1.55
Wire nails, Pittsburgh	2.35	2.35	2.35	1.95
Wire nails, Chicago dist. mill	2.40	2.40	2.40	2.00
Plain wire, Pittsburgh	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.25
Barbed wire, galv., Pittsburgh	2.85	2.85	2.85	2.60
Barbed wire, galv., Chicago dist. mill	2.90	2.90	2.90	2.65
Tin plate, 100 lb. box, P'gh	$5.25	$5.25	$5.25	$4.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$12.50	$12.50	$12.00	$8.50
Heavy melting steel, Phila	**11.75**	11.50	10.00	6.75
Heavy melting steel, Ch'go	**10.50**	10.00	8.75	5.25
Carwheels, Chicago	**10.50**	10.00	9.50	7.75
Carwheels, Philadelphia	11.75	11.75	10.75	8.00
No. 1 cast, Pittsburgh	11.25	11.25	11.25	9.00
No. 1 cast, Philadelphia	12.50	12.50	11.25	8.00
No. 1 cast, Ch'go (net ton)	9.50	9.50	8.50	6.25
No. 1 RR. wrot., Phila	11.00	11.00	11.00	7.50
No. 1 RR. wrot., Ch'go (net)	8.75	8.75	7.50	4.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.75	$3.75	$3.75	$1.75
Foundry coke, prompt	4.25	4.25	4.25	2.50

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	*7.25*	8.00	7.75	4.75
Lake copper, New York	*8.00*	8.25	8.00	5.00
Tin (Straits), New York	*52.00*	53.25	52.65	22.60
Zinc, East St. Louis	*4.25*	4.35	4.50	3.10
Zinc, New York	*4.60*	4.70	4.85	3.47
Lead, St. Louis	3.90	3.90	4.05	2.87½
Lead, New York	4.00	4.00	4.15	3.00
Antimony (Asiatic), N. Y.	7.25	7.25	7.25	5.45

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
Jan. 9, 1934	2.028c. a Lb.	$16.90 a Gross Ton	$11.58 a Gross Ton
One week ago	2.028c.	16.90	11.33
One month ago	2.028c.	16.90	10.25
One year ago	1.936	13.56	6.83
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel		Pig Iron		Steel Scrap	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
1933	2.036c., Oct. 3	1.867c., Apr. 18	$16.90, Dec. 5	$13.56, Jan. 3	$12.25, Aug. 8	$6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Miscellaneous Orders Raise Output at Pittsburgh

Ingot Rate Up One Point to 22 Per Cent—Production Also Higher in Wheeling District — Market Sentiment Is Buoyant

PITTSBURGH, Jan. 9.—Miscellaneous orders for finished steel in the past week were in sufficient volume to effect a slight lift in the Pittsburgh ingot output to 22 per cent. Production in the Valleys and nearby northern Ohio mills has apparently leveled off at 30 per cent. Output in the Wheeling district is up 15 points to 50 per cent.

Although the restricted character of current orders offers no definite assurance of further rises in ingot production, there is every likelihood that favorable factors already in sight will later convert present optimistic hopes into actualities. Large-scale demand for steel from the railroads is slowly but surely materializing, and producers of rails, track accessories and other steel products are awaiting the welcome pressure that prospective orders will impose on their operations.

Steel producers are scanning the New York automobile show for signs of the probable trend of retail buying early this year. It is suggested that the automotive industry will probably shape its actual production program for the year on the reaction of the public to the 1934 models. In addition, if current labor difficulties in the automotive field can be overcome shortly, accelerated production in that industry will smooth the way for major purchases of steel this month.

No significant change in the demand for structural steel is indicated by projected activity in public or private construction. However, producers of structural shapes are finally getting the benefit of orders for many public works jobs which had long suffered delays incidental to Government supervision and other red tape procedure. Further expansion of steel demand is expected from miscellaneous consuming quarters as a result of clearer conceptions of first quarter requirements revealed by inventories at the close of December.

Pig Iron

Merchant sellers entered the new year with all old contracts completed. Few foundries in this district have been disposed to contract ahead, and furnaces can not boast of imposing backlogs. Basic and Bessemer users continue to display little or no interest in the market. Although the recent uptrend in scrap prices has closed part of the gap between scrap and pig iron quotations, the adjustment has thus far been too slight to divert consumers back to the use of a greater percentage of virgin metal. Fourth quarter prices have been reestablished for delivery through first quarter.

Semi-Finished Steel

Some replenishment buying for stocks, which had been subjected to heavy December withdrawals, has been in evidence since the beginning of the year. Otherwise activity in this market has been of little significance. Billets, slabs and sheet bars are quoted at $26 a ton, Pittsburgh or Youngstown, and wire rods at $36, Pittsburgh or Cleveland, for first quarter.

Bars

Current interest is naturally apathetic after the heavy specifying during December. Bar mills are consequently running on reduced schedules, with little incoming busines to take up the slack. Renewal of automobile demand some time this month is expected to initiate more active business. The Pittsburgh base for soft steel bars is now uniformly established at 1.75c. a lb.

Reinforcing bars are moving almost entirely to public works projects. Recent specifications have covered restricted tonnages. For first quarter, billet steel reinforcing bars in stock lengths as quoted by distributors, are maintained at 1.80c., Pittsburgh base. On tonnage for identified projects this price is protected for the life of such jobs.

Plates and Shapes

Boiler and tank construction accounts for a recent increase in demand for plates. Individual tonnage requirements, however, are still small. Early prospects for barge construction offer little encouragement for plates. Some repair work at barge yards is in progress, but new bottoms are not in sight at the moment. Requirements of the railroads are expected to expand sharply as soon as current purchasing plans are actuated. The proposed car building program of the Pennsylvania Railroad and the Van Swearingen lines at present provide the brightest outlook for plate tonnage. In cases where railroad work can be classed as an identified project, the current Pittsburgh base of 1.70c. will be protected for the life of the job. On all other tonnage this quotation is applicable only through first quarter.

New structural steel inquiries are limited. Awards, however, appear to be gaining, and a good deal of tonnage that long has been pending is beginning to reach fabricating plants.

Wire Products

The aftermath of abnormally heavy December covering, principally by jobbers, against higher prices is sharply evident in reduced mill schedules. Operations are barely sustained by miscellaneous small lot orders which are drifting in. Recovery from the present inertia depends upon an expected seasonal demand for merchant wire from the agricultural districts in February. As soon as large-scale automobile production gets under way a further impulse to wire demand may be expected.

Tubular Products

Fourth quarter contracts were generally fulfilled at the close of December. Current tonnage on books is consequently slim. A steady flow of orders for oil country goods, however, is tending to offset a precipitate drop in pipe mill operations. Line pipe activity is not encouraging, nor is the outlook clearly definable. The recent nation-wide spell of freezing weather has deferred a good deal of small line work. High-pressure pipe and boiler tubing are very quiet. Prospects for locomotive boiler tubes and mechanical tubing, however, are brightened by the approach of important railroad equipment buying.

Sheets

Miscellaneous inquiry for sheets has picked up notably in the past week. Interest from the automobile makers is also apparent. The character of present demand suggests that consumers have been able to definitely gage first quarter requirements after taking inventories. Producers are encouraged over the immediate outlook for business, and expect to witness a resumption of important buying in the near future. Mills are engaged at about only 25 per cent of capacity, but if current inquiry materializes into orders, schedules will likely be increased shortly.

Tin Plate

The leading producer in this district is operating this week at about 50 per cent of capacity. Other mills are engaged intermittently, and the tin plate group is averaging probably not more than 40 per cent of capacity in the current week. New business since the first of the year has been at a minimum, and, with most consumers amply covered as a result of heavy takings against 1933 contracts, prospects for early improvement in demand are by no means bright.

Strip Steel

Although business has leveled off since the turn of the year, an accumulating demand from the automotive

industry is expected to be released before long. Manufacturers of implements for CWA work, who covered heavily in December, have temporarily narrowed their specifications. Miscellaneous consumers, however, are accounting for a fair amount of spot business. Some strip mills are operating intermittently, with the average for the group around 25 per cent of capacity.

Rails and Track Accessories

The New York Central Railroad is expected to enter the market soon for a sizable tonnage of rails and companion fastenings. That road will also open bids next week on its miscellaneous steel requirements for first quarter. Other rail and track accessory inquiries continue to appear, but no important orders have recently reached Pittsburgh district producers. Details in arranging Government loans are hampering final negotiations. When prospective tonnage reaches the mills delivery will probably not be urgent in most cases, and mill schedules are not expected to be accelerated for many weeks.

Cold-Finished Steel Bars

With the exception of a few unimportant items, fourth quarter contracts were generally completed on Dec. 31. Demand in the first ten days in January has been exceedingly quiet. Occasional small-lot orders from automobile makers are in evidence, and seasonal interest is beginning to appear among manufacturers of agricultural implements. Cold-finished bars are now quotable for first quarter at 2.10c. a lb., Pittsburgh.

Coke and Coal

Bituminous coal prices are in the process of adjustment. Some discrepancies have occurred in the set-up of code prices established by operators in West Virginia, the Lake regions and central and western Pennsylvania. In certain cases producers have reverted to quotations in effect last November, which indicates a withdrawal from the minimum bases set up under the code. Approach of the contracting period on April 1 is causing a lull in buying, and no larger scale covering is in prospect at the moment. Demand for coke is featureless. Minimum code prices for foundry and furnace coke are being strictly adhered to for delivery through January. Domestic coke was in good demand during the recent cold spell.

Scrap

Both buyers and sellers are apparently marking time. A considerable demand for scrap is evidently in the making, as mills face the early future with prospects of increased activity. Nevertheless, the market since the first of the year has been virtually bare of buying interest. The most recent indication of underlying strength is the disposal of part of the 1200 tons of No. 1 heavy melting steel on the Baltimore & Ohio list to a mill in a nearby district at $13.27, delivered. Tenders on the Pennsylvania scrap list, which includes 5250 tons of No. 1 steel, will be in this week, and it is practically conceded that the bidding will bring higher prices. Machine shop turnings are strong. Other grades reflect the strength of the major items. In the Youngstown district the situation is not so strong. The last sizable sale of No. 1 steel in that district was at $12.50, and shipments against the order have already been restricted.

Export Scrap Shipments Feature Boston Market

BOSTON, Jan. 9.—Scrap prices are holding up well to levels recently established, but, aside from barge shipments, the movement of material is comparatively small. Chelsea, Mass., interests continue to load barges of scrap for export via New York, and when present loadings are completed will have disposed of some 6000 tons of No. 1 heavy melting and No. 2 steel. A round tonnage of rails for relaying has just been shipped from Portland, Me., to South America.

Current buying of pig iron involves only an occasional car, generally for prompt delivery to some foundry that has unexpectedly obtained orders for castings. New England foundries are operating at around 20 per cent of rated capacity. December deliveries on old contracts were quite heavy. One furnace shipped better than 8000 tons. There are no inquiries of importance in the market.

Demand Slackens in South

BIRMINGHAM, Jan. 9.—Pig iron is now in the midst of a quiet period. December brought to a close an active movement that had extended through three months, during which time foundries with low-price contracts took as much as they could finance before the cancellation deadline. Deliveries were especially heavy last month. It is said that very little of the lowest price contract iron was left to be marked off.

Only one change has been made in furnace operations, Republic Steel Corpn. blew out one of its two active furnaces on Dec. 31, leaving nine operating furnaces in the district. Three are on basic iron, four on foundry, one on recarburizing and one on ferromanganese.

The current market quotation is unchanged at $13.50.

December business for pressure pipe plants was the best in several months. This came from CWA requirements, from regular channels and a few PWA projects. Orders were mostly from 30 to 100 tons each. It is not expected that January will maintain the December rate, but the outlook toward the end of the first quarter is better.

The scrap market is listless, with only a small amount of contract shipping and practically no new buying.

Steel

The December rush in wire products absorbed a heavy portion of the business ordinarily placed in January, with the result that there has been a recession in such tonnage since the first of the year. Sheets, which were carried along by wire products, have not slackened to the same extent and fair business is in prospect for this month.

The Ensley rail mill continues to operate on a steady schedule and there is no indication of an early stoppage.

Twelve out of 24 open-hearths are being worked, no change having taken place since the middle of December.

Pipe Lines

Independent Utilities Corpn., Jackson, Miss., plans steel pipe line to Winona, Miss., and vicinity, for natural gas. Franchise has been secured.

Bureau of Reclamation, Denver, asks bids until Jan. 15 for welded plate-steel pipe, 10½ ft. and 9 ft. diameter, respectively, for Owyhee and Snivley River siphons, with supporting brackets, roller assemblies, expansion joints, etc., Mitchell-Butte Division, Owyhee Project, Oregon-Idaho (Specification 558).

San Saba, Tex., plans steel pipe line system for natural gas supply and distribution. Financing is being arranged.

New York Central Railroad Co., 466 Lexington Avenue, New York, asks bids until Jan. 16 for steel pipe.

Red Bird, Okla., plans steel pipe line for natural gas. Fund of $300,000 is being arranged for this and other municipal work. T. P. Clonts, Muskogee, Okla., is engineer.

West Texas Chamber of Commerce, Fort Worth, Tex., is at head of project to install steel pipe lines for natural gas supply and distribution in group of west Texas towns, including Lampasas, Fredericksburg and Burnet. Application made for Federal loan for $1,000,000 for project.

Industrial Fuel Supply Co., Santa Fe Avenue, Compton, Cal., plans 10-in. steel pipe gas line from Wilmington, Los Angeles, over Nigger Slough Channel.

Railroad Equipment

Pennsylvania has reached an agreement with PWA for a loan of $32,000,000 to be used for building 101 electric locomotives, and 7000 freight cars.

Chesapeake & Ohio is inquiring for 11 baggage and mail cars and 15 coaches.

New York, Chicago & St. Louis is inquiring for one baggage and mail car and seven coaches.

Milwaukee Road is inquiring for 50 coaches and is expected shortly to issue inquiries for 25 baggage cars.

Rails

Missouri Pacific has placed 25,000 tons of 112-lb. rails with Colorado Fuel & Iron Co., Illinois Steel Co., Inland Steel Co. and Tennessee Coal, Iron & Railroad Co.

Southern Pacific Co. will take bids soon on 25,000 to 40,000 tons of rails.

Chicago Demand Light as Consumers Digest Stocks

Ingot Output Falls to 32 Per Cent—Production Is Partly for Stock—Scrap Prices Continue to Advance

CHICAGO, Jan. 9.—The important question now before the trade is how long it will take consumers to digest the stocks they were forced to accumulate in December to escape the penalty of higher prices. Ingot output has receded sharply from the high of 40 per cent of capacity reached at the end of December. The current rate of raw steel production is 32 per cent, or two points below a week ago. However, an important producer is stocking semi-finished materials and, if correction is made for this factor, output as represented by actual consumer demand has fallen 8½ points to an average of 25½ per cent. Unless unforeseen demand develops in the next few days, the lower figure will represent actual output by the end of the week, because semi-finished stocks will be replenished by that time.

The entire market is dominated by a watchful waiting policy. A lull at this time was fully expected and the question now is when will the upturn come.

In any event the trade expects automobile manufacturers, who are already beginning to take more steel, to be an increasingly important factor from this time on. The possibilities are good for heavier demands for steel from railroad equipment makers, farm machinery manufacturers and oil and gas producers.

Pig Iron

Shipments are dull, as was to have been expected following the rush to take commitments in December. However, there is no indication of a drop in melt and in western Michigan the use of pig iron is gradually expanding. Railway equipment manufacturers are in the market for the first time in many months. Sales are in moderate volume at $17.50 a ton for Northern foundry iron.

Reinforcing Bars

Shipments in the last two months of 1932 were the heaviest for any 60-day period since 1929. The bulk of this tonnage was brought out by Government expenditures. Sales did not keep pace with shipments, but much Government work is in sight. The opening days of January are quiet except for the appearance of plans for a Sears, Roebuck & Co. retail outlet store at Chicago, which will require about 250 tons. Bars have been awarded for two additional dams across the Mississippi River.

Cast Iron Pipe

Government money is now beginning to have real effect on this market. Six towns near Springfield, Ill., are opening bids on 6500 tons and other new projects are rapidly taking shape. A technicality is forcing Wilmette, Ill., to readvertise for 900 tons of 24-in. pipe. Springfield, Ill., is likewise readvertising for bids. Recent orders have come from Ashland and Sandusky, Ohio, Rosiclaire, Ill., and South Bend, Ind. Small miscellaneous tonnages are numerous.

Warehouse Business

Cold-finished steel bars and shafting, both round and hexagon, and flats and squares have been advanced 15c. a hundred lb. to $3.40. The movement of steel from warehouses is somewhat lighter, but the letdown is less sharp than a year ago at this time. Opinion among warehouse men is that business will gradually improve as January advances.

Sheets

Output is holding at 50 per cent of capacity and producers believe this to be the bottom for January. They base this opinion on the fact that consumption by automobile plants is increasing and these same users are closing for added requirements.

Wire Products

Operations are lower following the heavy clean-up of contracts that came at the end of the old year. Cancellations of fourth quarter contracts were not numerous. The trade is now somewhat concerned as to the time it will take to digest the tonnages in consumers' stocks. Estimates run all the way from a month to near the end of the first quarter.

Cold-Rolled Strips

Reports have been circulated that prices are to be advanced, but some producers deny that they have plans to participate in a move of this kind. Demand is all that can be expected until automobile manufacturers again come into the market on a large scale.

Bars

The comparatively heavy movement of bars against fourth quarter contracts obscures the actual consumption of this commodity. It is generally believed that small shops are gradually increasing output and there is some betterment in schedules now in force among farm implement manufacturers. The automobile industry is still to be heard from in a large way.

Plates

Improvement in this market is looked for from two sources—railroad equipment and the oil industry. The latest inquiries for railroad equipment come from the Milwaukee road and the Central of Georgia and, if PWA loans are approved, other Western railroads will enter the market. The oil industry, while still backward in the matter of equipment purchases, has active plans on foot and it is not uncommon to encounter reports that its 1934 purchases will greatly exceed the total for last year.

Shapes

Chicago fabricators estimate that fully 35,000 tons of work is in sight, of which about 15,000 tons will reach shops in the near future. Almost without exception inquiries are for Government-financed projects, though there is an occasional private undertaking. Several inquiries to be issued this month will bring to an end the Mississippi River dam work as provided in the present schedule. These projects have been the backbone of the local structural market for several months past.

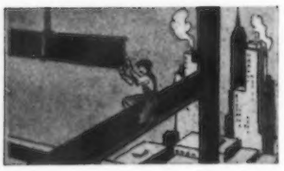
Rails and Track Supplies

The rail market is quiet but signs point to activity in the near future. The Santa Fe, which plans to take 50,000 tons, may soon enter the market. The Chicago & North Western is hesitating over the matter of putting up collateral for rail purchases and the Milwaukee Road is doubtful as to the course it will pursue. In the meantime Chicago rail mills are idle. The New York Central has signified its intention to purchase 40,000 tons.

Scrap

Prices continue to push ahead in spite of the fact that mill purchases are light and that ingot production continues its downward course. Mills have paid as high as $10.50 a ton, delivered, for heavy melting steel and dealers do not hesitate to reach out for tonnages at figures as high as $10.75. The market has now progressed sufficiently to indicate clearly that supplies are available at a price. Reports are reaching here that heavy accumulations have been made to the west and northwest of Chicago and that prices are near the point where much of this tonnage will move into this market. Railroad offerings are heavy, lists being out from the Pennsylvania, Pere Marquette, Nickel Plate, the Rock Island and other Western railroads.

Steel Bookings Fall Off In New York District



Reaction Expected After Heavy December Specifying — New York Central Inquiries for First Quarter Needs—11,600 Tons Awarded for Cape Cod Bridges

NEW YORK, Jan. 9.—A pronounced, but not unexpected, lull in steel bookings has set in since the holidays. Demand has been particularly slack in the case of commodities on which higher prices became effective Jan. 1. Shipments of such products were very heavy in the closing weeks of the last quarter. In fact, December business in bars, wire products and a number of other lines exceeded that of any other month last year outside of June. Tin plate shipments to certain can companies were heavy enough last quarter to cover estimated requirements for three to six months. On the other hand, export inquiries for tin plate, particularly from Japan, have improved.

The extent that stock accumulations will affect buying in coming weeks is difficult to forecast. While some companies built up their inventories, others are known to have adhered to the orthodox practice of holding down stocks at the year end. In certain cases inability to borrow prevented full specifying; in other instances the difficulty of anticipating the sizes of material required was the impeding factor. In sheets and strip, prices of which did not advance Jan. 1, there was no incentive to accumulate stocks and it is in these products that an early revival in demand is looked for.

American Bridge Co. has been awarded 11,660 tons for bridges over the Cape Cod Canal at Sagamore-Bourne, Mass. George F. Driscoll Co., New York, is low bidder on the general contract for the Midtown post office, New York, which was recently readvertised, and the structural steel, 10,000 tons, is about to be let.

The New York Central will take bids Jan. 16 on a maximum of 10,000 tons of bars, plates and shapes, a maximum of 560 tons of sheets, and varying amounts of billets, axles and wire nails, representing its first quarter requirements. Bidders must file separate delivered prices for all of the road's important shops. The railroad is also preparing to enter the market for about 40,000 tons of rails. The New York, New Haven & Hartford is asking for prices on a few carloads of black, galvanized and corrugated sheets for passenger car repairs to be undertaken under a recent PWA loan.

Advances in prices under the code, moderate though they have been, have partly offset the protection afforded American manufacturers by dollar depreciation, with the result that imports are again becoming troublesome. The inflexibility of code prices has made it difficult for American mills to meet this competition, even when it takes the form of only a small concession for ruling market quotations.

Pig Iron

The melting schedules of many foundries in this district have not recovered from the inventory and holiday interruptions, but sellers report that a better feeling prevails among most foundrymen. Operations of jobbing foundries continue in low volume, but other plants, especially pipe foundries, anticipate considerable improvement within the next month. Because of the present large yard stocks resulting from heavy December shipments, sales for the past seven-day period aggregated only 1500 tons. The major portion of the sales called for January delivery as many melters were forced to buy sparingly in order to complete mixtures. Furnace representatives generally expect market activity for the next six weeks to be confined to purchases of fill-in-carlots.

Reinforcing Steel

Public works continue to account for all the sizable tonnages awarded in this district. Concrete Steel Co. will supply 125 tons for a Howard University lecture hall at Washington, and will divide the 1000 tons required by a crossing elimination at Syracuse, N. Y., with Patterson-Leitch Co., Pittsburgh. Over 200 tons of mesh and bars for bridge work in Suffolk and Queens counties, N. Y., will be furnished by Kalman Steel Corpn. and Truscon Steel Co. Pending awards include over 700 tons for road construction in Pennsylvania, 500 tons for the subway approach to the Delaware River Bridge at Philadelphia, and over 300 tons for approaches to the Tri-borough Bridge at New York.

Scrap

The tone of this buying market continues to strengthen by virtue of a sustained domestic demand and the refusal of many dealers and brokers to meet buying offers. As a result of the active interest of pipe foundries in cast grades, 50c. advances to $8 and $8.50 a ton were made for heavy breakable and No. 1 machinery cast respectively. In addition, sales of specification pipe for $9, delivered Lebanon, Pa., represented a $1 rise to $6 a ton in this district. Brokers are now paying $7.75 and $6.50 on cars for No. 1 and No. 2 heavy melting steels for delivery to eastern Pennsylvania and Ohio valley mills. Barge quotations, however, are unchanged at $8 and $7 for No. 1 and No. 2 respectively, reflecting the recent contraction of export activity arising from advanced ocean rates and a general difficulty in securing ships.

St. Louis Road Buys 25,000 Tons of Rails

ST. LOUIS, Jan. 9.—The Missouri Pacific Railway has placed 25,000 tons of 112-lb. rails for use in 1934 with Colorado Fuel & Iron Co., Illinois Steel Co., Inland Steel Co. and Tennessee Coal, Iron & Railroad Co.

W. S. Maxon & Co., Dayton, Ohio, are low bidders on the lock and dam at Burlington, Iowa, requiring 1350 tons of steel sheet piling, 840 tons of structural steel and 500 tons of reinforcing bars. Bids will be opened at Rock Island, Ill., on Jan. 11 for lock No. 11 at Dubuque, Iowa, requiring 1250 tons of steel sheet piling, 950 tons of structural steel and 500 tons of reinforcing bars, and on Jan. 30 for lock No. 10 at Guttenberg, Iowa, requiring 1400 tons of steel sheet piling, 930 tons of structural steel and 550 tons of reinforcing bars.

The Seventh Street viaduct in Kansas City, requiring 1250 tons of structural steel, has been awarded to the Kansas City Structural Steel Co. Atlas Iron Works of St. Louis has been awarded 100 tons of structural steel for an addition to the Chevrolet Motor Co. buildings in this city.

The pig iron trade is quiet, and not much business is looked for in the next week or so. Stove manufacturers are expected to come into the market for their requirements as soon as they have returned from selling trips to the furniture market openings at Chicago and Grand Rapids.

Although no scrap was placed by mills during the week, prices were higher because of strength shown in other markets, the small number of offerings here and the export demand. Selected heavy melting steel, No. 1 heavy melting, miscellaneous rails steel car axles, and wrought iron bars and transoms are 50c. a ton higher; No. 2 heavy melting, rails for rolling and cast iron carwheels are 25c. a ton higher, and railroad springs and No. 2 railroad wrought are up 75c. a ton.

Philadelphia District Steel Making Rate Declines Further

Railroad Business Expected to Increase Activity Late in Month — Pennsylvania Will Inquire Soon for 50,000 Tons of Car Building Steel

PHILADELPHIA, Jan. 9.—With the first month of the new year well under way, the steel business is just about up to expectations. The rush of specifications experienced in December has completely subsided and demand for finished steel products is comparable to the November volume. Steel ingot production in the eastern Pennsylvania district, including Maryland and Delaware, has declined several points, averaging 22 to 23 per cent of capacity. The smaller plants are affected most seriously, many of them operating but one open-hearth furnace out of batteries of six to 12. The leading interest has maintained production at a better rate, but principally to build up inventories which were depleted during the December rush.

Despite the present lull in demand, sentiment in the trade is anything but pessimistic. Even though January brings no sharp upturn in orders, opinion is unanimous that February and March will see gradual improvement which will be reflected further in the second quarter. The Pennsylvania Railroad will likely secure formal approval of its PWA loan from the Interstate Commerce Commission before the end of the week, and is expected to inquire almost immediately for 50,000 tons or more of bars, plates, shapes and sheets for the construction of 7000 freight cars in its own shops. This carrier is also expected soon to release tonnage against its recent rail and track accessory purchase.

The largest public works project in the district is the subway connection for the Philadelphia-Camden bridge. Bids for the Philadelphia approach will be opened Jan. 15, calling for 1500 tons of structural steel and 500 tons of reinforcing bars. The McClintic-Marshall Corpn. has taken 1040 tons of structural steel for a building for the Celanese Corpn. at Amsello, Md.

Bars, Plates and Shapes

With current specifications extremely light, attention is focused on the requirements of the Pennsylvania Railroad's freight car building program. Inquiry is expected as soon as final approval of the PWA loan sought by this carrier is obtained at Washington, and at least 50,000 tons of bars, plates, shapes and sheets will be required. Present plans call for the construction of 4500 box and 1500 flat cars, all in the company's shops. A considerable tonnage of steel will also be needed for completion of the electrification of this road between Wilmington, Del., and Washington. Structural awards are mostly of small tonnage although a factory addition for the Celanese Corpn. at Amsello, Md., required 1040 tons. New inquiry is confined almost entirely to public works projects.

Pig Iron

Demand is very light, but December shipments were so heavy that sellers expected little buying in the first half of the quarter. Foreign competition is less pronounced because of the favorable exchange rate, particularly in the case of Dutch iron.

Imports

The following iron and steel imports were received here last week: 6200 tons of iron ore from Tunis, 175 tons of ferromanganese from Norway, and 54 tons of steel bars and 29 tons of steel tubes from Sweden. In the previous week imports were as follows: 2924 tons of pig iron from British India, 100 tons of ferromanganese from Poland, and 16 tons of steel bars from Sweden.

Sheets

Business is confined to carload lots, but most of the demands are urgent indicating low stocks on the part of many users. The leading automotive consumers in the district are making no new commitments but are reducing stocks by their current manufacturing schedules. Radio makers are seasonably inactive.

Scrap

The scrap market continues strong with No. 1 heavy melting steel quotable at $11.50 to $12, compared with a flat $11.50 last week. While no significant sales have actually been made at the higher level, dealers have turned down offers at this price because of their inability to cover safely at the figure. Heavy breakable cast is also stronger with sales to two consumers reported at $11.50.

Small Plants Asked to Submit NRA Difficulties

ON Dec. 13, 1933, a Committee on Small Industries was appointed by Gerard Swope, chairman, Business Advisory and Planning Council for the Department of Commerce, to study carefully the actual effects of the application of the National Recovery Act upon the small industries. The committee, which consists of Henry S. Dennison (chairman), president, Dennison Manufacturing Co., Framingham, Mass., Ralph E. Flanders, president, Jones and Lamson Machine Co., Springfield, Vt., and Morris E. Leeds, president, Leeds and Northrup, Philadelphia, began at once to gather in a variety of trades cases of damage to small companies which has been attributed to the effects of the Recovery Act. The assistance of several offices of the Recovery Administration has also been offered to this end.

It is important, of course, that the precise causes of damage and the circumstances of each case be known, if definite and practical measures are to be recommended. The committee will be glad to have specific and detailed reports of such cases brought to its attention. They may be mailed to Thomas R. Taylor, Room 4823, Department of Commerce Building, Washington.

It is apparent already that the influences of NRA upon small concerns vary widely. Some have been reported as having been greatly helped, others as having been closed down completely. Moreover, there is no precise size of concern which can be called "small," since a small company in one trade may be bigger than the largest in another. In its early stages, therefore, the study will pay attention to any reports of damage upon which detailed information is given and which can reasonably be attributed to the effects of the Recovery Act.

Wabash and New Haven Loans Granted

WASHINGTON, Jan. 9.—The Interstate Commerce Commission today approved applications of the New York, New Haven & Hartford and receivers of the Wabash Railroad for public works loans to be used for improvement and maintenance work. At the same time the Commission denied a petition of the Boston & Maine Railroad for approval of release of $1,250,000 collateral pledged with the RFC with a view to borrowing $1,200,000 to make repairs and improvements to locomotives and freight and passenger cars.

Increase in Automotive Orders at Cleveland

Sheet and Strip Bookings Show Moderate Gain Over December—Ingot Output Off But Due to Regain Loss Shortly

CLEVELAND, Jan. 9.—New orders from the automotive industry for sheets and strip steel show a moderate increase over December and indicate that some of the manufacturers who have been delayed by manufacturing problems due to model changes are getting in shape to step up production, although the gain may not be conspicuous for a few weeks. Deliveries of full-finished sheets against these new orders cannot be made until around Feb. 1.

The improvement in the demand for finished steel from the automotive industry is offset by a lack of new orders for bars, plates and shapes, the demand for which has been almost negligible so far this month, as consumers accumulated good stocks against contracts at the fourth quarter prices before the end of December. Without backlogs, most of the mills rolling the heavier steel products are badly in need of orders.

Ingot output in the Cleveland-Lorain territory is 47 per cent of capacity this week, a loss of three points, but the rate of the previous week is likely to be regained, as one local open-hearth furnace that is shut down for repairs is scheduled to resume during the latter part of the week. Another local steel maker, having fresh orders from the automotive industry has added another open-hearth furnace.

The National Tube Co. has put on a second blast furnace in Lorain, which has been banked for three months. An optimistic feeling prevails in the steel industry, which finds much encouragement in the outlook for the latter part of the current quarter, due to the expected demand from the railroads, the automotive industry and for carrying out various projects under the Government public works program.

Bids for the 12,000 cars for the Erie, Chesapeake & Ohio and Nickel Plate railroads will be taken Jan. 15. No new railroad inquiries have come out.

No price changes are reported on finished steel products and none is expected during the current quarter. Local scrap prices have advanced.

Pig Iron

New demand is very light, as was to be expected after the good volume of orders against old contracts placed in the latter part of December. Furnaces have light order books and most foundries good stocks. Considerable Southern and silvery iron contracted for at lower prices than now prevailing was canceled by consumers in this territory at the end of December, although foundries took as much of this iron as they could conveniently pay for. Jobbing foundries will benefit shortly from public work. Some inquiry has come out for sewer manholes and covers.

Bars, Plates and Shapes

Orders are scarce and confined to small lots which are being taken at the new prices. Improvement in demand is looked for in the latter part of the month when some consumers get present stocks reduced. Some orders in small lots for reinforcing bars are being placed for spring delivery for Ohio highway work.

Sheets

New business showed a moderate gain the past week and some mills have enough tonnage to assure fair operations for three or four weeks. While demand from the automotive industry still is restricted by delays in getting under production on new models, some new tonnage came from that source during the week, although none of the orders was large. The local Fisher Body plant still has a good stock that was accumulated about Nov. 15, when it expected to get under production on Chevrolet bodies. Some consumers in other fields have good stocks that were accumulated in October at the old prices, and others have about used their stocks.

Strip Steel

Demand for both hot and cold strip is showing more activity than for several weeks. Some new business came during the week from the automotive industry for making lamp shells and also from local stamping plants that have taken orders for automobile parts. Good specifications for hot-rolled strip came from manufacturers of cold-rolled strip.

Bolts, Nuts and Rivets

While orders are light, manufacturers regard the prospects as excellent for the first quarter. Bolt and nut makers expect a good business from the motor car industry, from railroad car builders and for various Government flood control and other projects. New orders are expected shortly from jobbers who have not been in the market recently, having stocked up before the October price advance.

Scrap

Prices have advanced 25 to 50c. a ton on leading steel-making and blast furnace grades, and the market is very firm. The higher prices have resulted from demand from dealers to cover against orders taken in December, against which restricted shipments are being taken by consumers. With limited production and the disposition of some dealers to hold their scrap for better prices, the available supply is not plentiful. A Cleveland mill during the week purchased machine shop turnings at a reported price of $8.50 and dealers are paying $8.25 for this grade, an advance of $1 a ton over the recent nominal quotation.

Large Purchase of Scrap at Buffalo

BUFFALO, Jan. 9.—The Buffalo scrap trade is enthusiastic over the outlook. The feature of the past week was a 10,000 ton purchase by the largest consumer in the district. This company bought most of its tonnage at $11 for No. 1 heavy melting steel and $9.50 for No. 2. Some smaller lots were acquired at $10 and $8.50. As this interest usually buys somewhat under the market price, dealers are freely predicting advances of $1 to $1.50 over present prices, and the more optimistic see $13 or $14 steel within this quarter.

One open-hearth has been taken off at the Lackawanna plant of Bethlehem Steel Corpn., reducing the active list at this plant to six. Republic Steel Corpn. continues to operate four, not including its 200-ton unit, and the Wickwire-Spencer Corpn. is operating one. The Seneca sheet division of Bethlehem is running at about 40 per cent of capacity.

December sales of warehouse material were above those of November, and January has started out at the same pace as December.

With pig iron contracted for in the last quarter either delivered or wiped off the books, a lull has set in. Little indication of major activity during the coming 30 days appears at this time. The end of 1933 found five stacks blowing in this district, one at the Lackawanna plant of the Bethlehem Steel Corpn., two at the Hanna Furnace Corpn., one at Republic Steel Corpn., and one at the Tonawanda Iron Corpn. This operation is being maintained.

Reinforcing Steel

Awards 3700 Tons—New Projects 3100 Tons

AWARDS

Syracuse, N. Y., 1000 tons, New York Central Railroad crossing elimination, divided between Concrete Steel Co. and Patterson Leitch Co.

Washington, 125 tons, Howard University classroom, to Concrete Steel Co.

Queens County, N. Y., 100 tons, highway bridge, to Truscon Steel Co.

Suffolk County, N. Y., 100 tons, mesh and bars for railroad grade crossing elimination, to Kalman Steel Corpn.

Chicago, tonnage being estimated, $1,500,000 retail store building for Sears Roebuck & Co.

Bellevue, Iowa, 550 tons, dam across Mississippi River.

Winona, Minn., 360 tons, dam across Mississippi River, to Inland Steel Co.

State of Colorado, 180 tons, highway work in five counties, to various bidders.

Denver, 400 tons, material for Bureau of Reclamation, to Inland Steel Co.

Hamilton Field, Cal., 100 tons, non-commissioned officers' quarters, to Gunn-Carle Co.

State of California, 130 tons, bridges in Los Angeles and Mendicino Counties, to various bidders.

Pearl Harbor, Hawaii, 650 tons, fleet moorings at Navy Yard, to Pacific Coast Steel Co.

NEW REINFORCING BAR PROJECTS

New York, 300 tons, approach foundation for Tri-borough Bridge; bids Jan. 19.

Philadelphia, 500 tons, Delaware River Bridge approach foundation; bids Jan. 15.

Dubuque, Iowa, 500 tons, Lock No. 11; bids Jan. 11 by United States Engineer, Rock Island, Ill.

Guttenberg, Iowa, 550 tons, Lock No. 10; bids to be opened Jan. 30 by United States Engineer, Rock Island.

Burlington, Iowa, 500 tons, Lock No. 18; W. S. Maxon & Co., Dayton, Ohio, low bidder.

State of Utah, 120 tons, highway work in four counties; bids Jan. 17.

Tulare County, Cal., 120 tons, State paving; bids Jan. 24.

Lawndale, Cal., 400 tons, mausoleum; bids soon.

Los Angeles County, Cal., 105 tons, State bridge across Ramona Boulevard and Marengo Street; bids Jan. 24.

Los Angeles, 870 tons, material for city, Specification No. 137; bids soon.

State of Oregon, 100 tons, highway work in six counties; bids Jan. 18.

Cast Iron Pipe

Providence, R. I., closed bids Jan. 2 on 6,000 tons; United States Pipe & Foundry Co. was low bidder.

St. Johnsboro, Vt., has taken bids on 18,100 ft. of 6 to 20-in. centrifugal pipe and 32 tons of specials.

Glens Falls, N. Y., plans new water trunk line from Queensbury, about 2½ miles, replacing present pipe line. Federal appropriation of $83,000 has been secured.

Springfield, Ill., has taken new bids on 2300 tons.

Wilmette, Ill., has readvertised for 500 tons of 24-in.

South Bend, Ind., has purchased 200 tons from an unnamed bidder.

Sandusky, Ohio, has placed 300 tons with American Cast Iron Pipe Co.

Rosiclare, Ill., has awarded 300 tons to McWane Cast Iron Pipe Co.

Ashland, Ohio, has awarded 150 tons to James B. Clow & Sons.

Board of Public Utilities, Kansas City, Kan., closed bids Jan. 3 on 380 tons of 6 to 12-in., and for about 10 tons of fittings.

Oak Grove, Mo., plans pipe line system for water supply. Cost about $41,000, with auxiliary water-works equipment. Application has been made for Federal grant and loan. Shockley Engineering Co., Graphic Arts Building, Kansas City, Mo., is engineer.

Hammond, Ill., plans about 12,000 ft. of 4 and 6-in. for water supply, with waterworks pumping station and 40,000-gal. elevated steel tank and tower. Cost about $35,000. Financing is being arranged. Warren & Van Praag, Decatur, Ill., are engineers.

Suburban Homes Co., Room 912, 101 West Eleventh Street, Kansas City, Mo., plans quantity 4-in. for water supply system on 2000-acre tract, with elevated steel tank and tower, and other waterworks equipment. Cost $77,000. Black & Veatch, Mutual Building, Kansas City, are consulting engineers.

Huntington Park, Cal., rejected bids recently received for pipe and fittings for water supply system, and will purchase on open market.

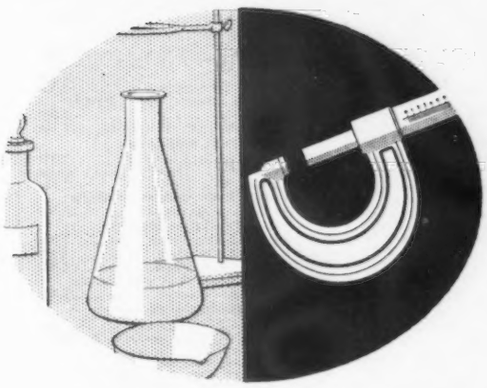
Hanford, Cal., has awarded 100 tons of 4-in. to Pacific States Cast Iron Pipe Co.

Napa, Cal., has awarded 145 tons of 6 and 8-in. to American Cast Iron Pipe Co.

Los Angeles will take bids for 200 tons of 2-in. on Jan. 11.

San Francisco will take bids soon on first unit of a project which will require 17,000 tons.

WYCKOFF



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No matter how close the tolerance—or how exacting the chemical and physical specifications—you can always depend on the micrometric accuracy of Wyckoff Steels to meet your requirements most satisfactorily and economically.

That's why it always pays to specify Wyckoff.

WYCKOFF DRAWN STEEL COMPANY

GENERAL OFFICES: Ambridge, Pa.
MILLS at Ambridge, Pa. and Chicago, Ill.

Manufacturers of
COLD DRAWN STEELS
Turned and Polished Shafting Turned and Ground Shafting

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel	*Base per Lb.*
F.o.b. Pittsburgh mill	1.75c.
F.o.b. Chicago or Gary	1.80c.
Del'd Philadelphia	2.04c.
Del'd New York	2.08c.
F.o.b. Cleveland	1.80c.
F.o.b. Buffalo	1.85c.
F.o.b. Birmingham	1.90c.
F.o.b. cars dock Pacific ports	2.30c.
F.o.b. cars dock Gulf ports	2.15c.

Rail Steel (For merchant trade)	
F.o.b. Cleveland	1.70c.
F.o.b. Chicago	1.70c.
F.o.b. Gary	1.70c.
F.o.b. Pittsburgh	1.65c.
F.o.b. Buffalo	1.75c.
F.o.b. Birmingham	1.80c.

Billet Steel Reinforcing
(Stock lengths as quoted by distributers; cutting to length, 60 in. and over takes extra of 10c. per 100 lb.)

F.o.b. P'gh mills	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. Buffalo	1.85c.
F.o.b. Cleveland	1.85c.
F.o.b. Youngstown	1.85c.
F.o.b. cars dock Pacific ports	2.35c.
F.o.b. cars dock Gulf ports	2.20c.

(Cut lengths as quoted by distributers.)

F.o.b. Chicago	1.95c.

Rail Steel Reinforcing
(Cut lengths as quoted by distributers)

F.o.b. Pittsburgh	1.75c.
F.o.b. Cleveland	1.80c.
F.o.b. Chicago	1.80c.

Iron

Common iron, f.o.b. Terre Haute, Ind.	1.60c. to 1.75c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	1.89c.
Common iron del'd New York	1.92c.

Steel Car Axles

F.o.b. Pittsburgh	2.50c.
F.o.b. Chicago	2.50c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Birmingham	1.85c.
Del'd Cleveland	1.885c.
Del'd Philadelphia	1.885c.
F.o.b. Coatesville	1.80c.
F.o.b. Sparrows Point	1.80c.
Del'd New York	1.98c.
F.o.b. dock cars Pacific ports	2.25c.
F.o.b. cars dock, Gulf ports	2.10c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Floor Plates

F.o.b. Pittsburgh	3.20c.
F.o.b. Chicago	3.25c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.
F.o.b. Buffalo	1.80c.
F.o.b. Bethlehem	1.80c.
Del'd Cleveland	1.885c.
Del'd Philadelphia	1.905c.
Del'd New York	1.9525c.
F.o.b. cars dock, Gulf ports	2.10c.
F.o.b. dock cars Pacific ports (standard)	2.25c.
F.o.b. dock cars Pacific ports (wide flange)	2.35c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.00c.
F.o.b. Chicago mill	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base...2.45c. a lb. except at Bethlehem where the price is 2.55c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (½% Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.95
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Cold Finished Bars*

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.10c.
Bars, f.o.b. Chicago	2.15c.
Bars, Cleveland	2.15c.
Bars, Buffalo	2.20c.
Bars, Detroit	2.30c.
Bars, eastern Michigan	2.35c.
Precision round bars, Pittsburgh	2.30c.
Precision round bars, Cleveland	2.35c.
Precision round bars (alloy), Pitts.	3.00c.
Shafting, ground, f.o.b. mill, 1-3/16 to 1½ in.	3.40c.
1-3/16 to 1½ in.	2.90c.
1-9/16 to 1⅞ in.	2.75c.
1-15/16 to 2⅜ in.	2.60c.
2-15/16 to 6 in.	2.45c.

* In quantities of 10,000 to 19,000 lb.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.75c.
No. 10, f.o.b. Gary	1.85c.
No. 10, del'd Phila.	2.04c.
No. 10, f.o.b. Birmingham	1.90c.
No. 10, f.o.b. dock cars Pacific ports	2.42½c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.25c.
No. 24, f.o.b. Gary	2.35c.
No. 24, del'd Phila.	2.54c.
No. 24, f.o.b. Birmingham	2.40c.
No. 24, f.o.b. dock cars Pacific ports	2.95c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.30c.
No. 10 gage, f.o.b. Gary	2.40c.
No. 10 gage, del'd Phila.	2.59c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.00c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.75c.
No. 20 gage, f.o.b. Gary	2.85c.
No. 20 gage, del'd Phila.	3.04c.
No. 20 gage, f.o.b. dock cars Pacific ports	3.45c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.85c.
No. 24, f.o.b. Gary	2.95c.
No. 24, del'd Phila.	3.14c.
No. 24, f.o.b. Birmingham	3.00c.
No. 24, f.o.b. dock cars Pacific ports	3.55c.
No. 24 Wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.25c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	2.90c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.65c.
No. 28, Gary	2.75c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate
(F.o.b. Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., P'gh	1.75c.
All widths up to 24 in., Chicago	1.85c.
Cooperage stock, Pittsburgh	1.85c.
Cooperage stock, Chicago	1.95c.

Cold-Rolled Strips

F.o.b. Pittsburgh	2.40c.
F.o.b. Cleveland	2.40c.
Del'd Chicago	2.68c.
F.o.b. Worcester	2.60c.

Fender Stock

No. 20, Pittsburgh or Cleveland	3.10c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade

	Per Lb.
Bright wire	2.20c.
Spring wire	2.20c.

To Jobbing Trade

Extras of 10c. a 100 lb. on joint carloads and 30c. on pooled cars and less-than-carload lots are applied on all merchant wire products. An allowance of $2 a ton is made to jobbers on straight, mixed or joint carloads; $3 a ton is allowed on less-than-carload shipments.

	Base per Keg
Standard wire nails	$2.35
Smooth coated nails	2.35
Galvanized nails:	
15 gage and coarser	4.35
16 gage and finer	4.85

	Base per 100 Lb.
Smooth annealed wire	$2.35
Smooth galvanized wire	2.70
Polished staples	3.05
Galvanized staples	3.30
Barbed wire, galvanized	2.85
Woven wire fence, base column	60.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	*Wrought Iron* Inches	Black	Galv.
⅛	51½	29½	⅛	+91½	+138
¼ to ⅜	57	38½	¼ & ⅜	+11½	+21½
½	62	50½	½	31½	15
¾	65½	55½	¾	36½	20½
1 to 3	67½	58½	1 & 1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	63½	54½	2	37	22½
2½ to 3	66½	57½	2½ to 3½	38	25
3½ to 6	68½	59½	4 to 8	40	28½
7 and 8	67½	57½	9 to 12	38	24½
9 and 10	67	57			
11 and 12	66	56			

Butt Weld, extra strong, plain ends

⅛	48½	33½	⅛	+13	+45½
¼ to ⅜	54½	41½	¼ & ⅜	+2½	+34½
½	60	51	½	32½	17½
¾	64½	55½	¾	37½	22½
1 to 3	66½	58½	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	61½	53½	2	40	26
2½ to 3	65½	57½	2½ to 4	45½	33
3½ to 6	69	61	4½ to 6	45	32½
7 and 8	68	58	7 & 8	46	33
9 and 10	67	57	9 to 12	41½	30
11 and 12	66	56			

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		*Charcoal Iron*	
2 in. and 2¼ in.	33	1½ in.—1¾ in.	44
2½ in.—2¾ in.	40	2 in.—2¼ in.	13
3 in.	44	2½ in.—2¾ in.	16
3½ in.—3½ in.	47	3 in.	17
4 in.	49	3½ in. to 3½ in.	18
4½ in. to 6 in.	42	4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five. Exception: On 1¼ to 1¾-in. charcoal iron tubes no supplementary discounts are granted, and the discount for 10,000 lb. to a carload is 4 points under base and for less than 10,000 lb. 8 points under base.

Standard Commercial Seamless Boiler Tubes
Cold-Drawn

1 in.	46	3 in.	38
1¼ to 1½ in.	46	3½ to 3½ in.	41
1¾ in.	46	4 in.	43
2 to 2¼ in.	37	4½, 5 and 6 in.	36
2½ to 2¾ in.	34		

Hot-Rolled

2 and 2¼ in.	32	3½ to 3½ in.	47
2½ and 2¾ in.	40	4 in.	49
3 in.	44	4½, 5 and 6 in.	42

In the case of all sizes except 1-in. to 1¾-in. cold-drawn boiler tubes supplementary discounts of two 5 per cents are allowed on carload lots. On quantities up to 10,000 lb. the base discount is reduced 10 points and a supplementary discount of 5 per cent only is allowed. On quantities 10,000 lb. to 24,999 lb. the base discount is reduced 6 points and a supplementary discount of 5 per cent only is allowed. On 25,000 lb. to a carload the base discount is reduced 2 points and supplementary discounts of two 5 per cents are allowed.

On 1 to 1¾-in. cold-drawn boiler tubes, there are no supplementary discounts. On quantities up to 10,000 lb. the base discount is reduced 12 points; on 10,000 lb. to 24,999 lb., it is reduced 8 points; on 25,000 lb. to a carload it is reduced 2 points.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, 60-lb. and heavier, per gross ton	$36.37½
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$32.00
Light rails (from rail steel) per gross ton	31.00

Base per 100 Lb.	
Spikes, 9/16 in. and larger	$2.40
Spikes, ½ in. and smaller	2.40
Spikes, boat and barge	2.40
Tie plates, steel	1.90
Track bolts, to steam railroads	3.55
Track bolts, to jobbers, all sizes (per 100 count)	70 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Stove bolts in packages, P'gh.	70, 25 and 10
Stove bolts in packages, Ch'go.	70, 25 and 10
Stove bolts in packages, Cleveland.	70, 25 and 10
Stove bolts in bulk, P'gh.	80
Stove bolts in bulk, Chicago	80
Stove bolts in bulk, Cleveland	80
Tire bolts	60

Large Rivets
(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.75
F.o.b. Chicago and Birmingham	2.85

Small Rivets
(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago and Birm'g'm	70 and 10

Cap and Set Screws
(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screw, 1 in. dia. and smaller	75, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screw, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85
Upset set screws cut and oval point	75 and 10
Milled studs	65 and 5

STAINLESS STEEL

(18% Cr, 8% Ni, 0.08 to 0.20% C)
(Base Prices, f.o.b. Pittsburgh)

	Per Lb.
Bars	23c.
Plates	26c.
Sheets	33c.
Hot-rolled strip	23.50c.
Cold-rolled strip	30.00c.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Youngstown, Chicago, Gary, Buffalo, Cleveland, Birmingham.

	Per Gross Ton
Rerolling	$26.00
Forging quality	31.00

Sheet Bars

F.o.b. Pittsburgh, Youngstown, Cleveland, Chicago, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open-hearth or Bessemer	$26.00

Skelp

F.o.b. Pittsburgh, Youngstown, Chicago, Buffalo, Coatesville, Pa., or Sparrows Point, Md.

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Pig Iron, Ores, Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$18.50	$19.00	$18.00	$19.50
Bethlehem, Pa.	18.50	19.00	18.00	19.50
Birdsboro, Pa.	18.50	19.00	18.00	19.50
Swedeland, Pa.	18.50	19.00	18.00	19.50
Sparrows Point, Md.	18.50	....	18.00	....
Neville Island, Pa.	18.00	18.00	17.50	18.50
Sharpsville, Pa.	17.50	17.50	17.00	18.00
Youngstown	17.50	17.50	17.00	18.00
Buffalo	17.50	18.00	16.50	18.50
Erie, Pa.	17.50	18.00	17.00	18.50
Cleveland	17.50	17.50	17.00	18.00
Toledo, Ohio	17.50	17.50	17.00	18.00
Detroit	17.50	17.50	17.00	18.00
Hamilton, Ohio	17.50	17.50	17.00	18.00
Chicago	17.50	17.50	17.00	18.00
Granite City, Ill.	17.50	18.00	17.00	....
Duluth, Minn.	18.00	18.00	....	18.50
Birmingham	13.50	....	12.50	....
Provo, Utah	16.50	....	....	....

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District				
From Everett, Mass.	$19.00	$19.50	$18.50	$20.00
From Buffalo	19.00	19.50	18.50	20.00
Brooklyn				
From East. Pa. or Buffalo	20.77	21.27	20.27	21.77
Newark or Jersey City, N. J.				
From East. Pa. or Buffalo	19.89	20.39	19.39	20.89
Philadelphia				
From Eastern Pa.	19.26	19.76	18.76	20.26
Cincinnati				
From Hamilton, Ohio	18.51	18.51	18.01	19.01
Canton, Ohio				
From Cleveland and Youngstown	18.76	18.76	....	....
Columbus, Ohio				
From Hamilton, Ohio	19.50	19.50	....	....
Mansfield, Ohio				
From Cleveland and Toledo	19.26	19.26	....	....
Indianapolis				
From Hamilton, Ohio	19.77	19.77	....	....
South Bend, Ind.				
From Chicago	19.55	19.55	....	....
Milwaukee				
From Chicago	18.50	18.50	....	....
St. Paul				
From Duluth	19.44	....	....	....
Davenport, Iowa				
From Chicago	19.26	19.26	....	....
Kansas City				
From Granite City	20.04	20.54	....	....

Delivered prices on Southern iron for shipment to Northern points are 3&c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa. and Standish, N. Y.	$23.00
Johnson City, Tenn.	23.00
Del'd Chicago	28.65

GRAY FORGE PIG IRON

Valley furnace	$17.50

CHARCOAL PIG IRON

Lake Superior furnace	$20.50
Delivered Chicago	23.54
Delivered Buffalo	23.78

CANADA

Pig Iron

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.25	20.50
Malleable	21.00
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard, (carload)	$85.00
Domestic, 80%, seaboard, (less carloads)	92.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$27.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads) (duty paid)	31.00
14% to 16% (less carloads)	38.50

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

	Per Gross Ton		Per Gross Ton
6%	$22.25	12%	$29.25
7%	23.25	13%	30.75
8%	24.25	14%	32.25
9%	25.25	15%	33.75
10%	26.25	16%	35.25
11%	27.75	17%	36.75

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$27.25	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 1½ to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	94c.
Ferrotungsten, less carloads	$1.00
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	16.50 to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained V.	$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorous, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$36.00
Ton lots or less, per ton	41.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	85.00
2% carbon grade	90.00
1% carbon grade	100.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorous, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	9.50c.
Iron, low phos., Swedish, average 65½% iron	9.50c.
Iron, basic or foundry, Swedish, average, 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron (nom.)	9c.
Manganese, Caucasian, washed 52%	22c.
Manganese, African, Indian, 44-48%	20c.
Manganese, African, Indian, 49-51%	21c.
Manganese, Brazilian, 46 to 48½	17c.

	Per Net Ton Unit
Tungsten, Chinese wolframite, duty paid*	$12.00
Tungsten, domestic scheelite*	$11.00 to $12.00

	Per Gross Ton
Chrome, 45%, CrsOs, crude, c.i.f. Atlantic Seaboard	16.00
Chrome, 48%, CrsOs, c.i.f. Atlantic Seaboard	18.00

*Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines	$15.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	16.00
Foreign, 80% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	18.50
Domestic, No. 1 ground bulk, 85 to 93% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	20.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$12.25 to $12.75
No. 2 heavy melting steel	11.00 to 11.50
No. 2 railroad wrought	12.25 to 12.75
Scrap rails	12.25 to 12.75
Rails 3 ft. and under	14.00 to 14.50
Sheet car crops, ordinary	13.00 to 13.50
Compressed sheet steel	11.75 to 12.25
Hand bundled sheet steel	10.25 to 10.75
Hvy. steel axle turnings	10.25 to 10.75
Machine shop turnings	8.25 to 8.75
Short shov. steel turnings	8.25 to 8.75
Short mixed borings and turnings	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Cast iron carwheels	11.00 to 11.50
Heavy breakable cast	11.00 to 11.50
No. 1 cast	11.00 to 11.50
Railr. knuckles and couplers	14.00 to 14.50
Rail, coil and leaf springs	14.00 to 14.50
Rolled steel wheels	14.00 to 14.50
Low phos. billet crops	15.25 to 15.75
Low phos. sheet bar crops	14.50 to 15.00
Low phos. plate scrap	14.00 to 14.50
Low phos. punchings	14.50 to 15.00
Steel car axles	13.50 to 14.50

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$10.25 to $10.75
Shoveling steel	10.25 to 10.75
Hydraulic comp. sheets	$8.75 to $9.25
Drop forge flashings	7.75 to 8.25
No. 1 busheling	8.50 to 9.00
Rolled carwheels	11.00 to 11.50
Railroad tires	11.50 to 12.00
Railroad leaf springs	11.00 to 11.50
Axle turnings	8.50 to 9.00
Steel couplers and knuckles	11.00 to 11.50
Coil springs	12.00 to 12.50
Axle turnings (elec. fur.)	8.75 to 9.25
Low phos. punchings	12.50 to 13.00
Low phos. plates, 12 in. and under	12.50 to 13.00
Cast iron borings	6.00 to 6.50
Short shoveling turnings	6.00 to 6.50
Machine shop turnings	5.00 to 5.50
Rerolling rails	11.00 to 11.50
Steel rails, less than 3 ft.	12.00 to 12.50
Steel rails, less than 2 ft.	12.50 to 13.00
Angle bars, steel	11.00 to 11.50
Cast iron carwheels	10.50 to 11.00
Railroad malleable	11.00 to 11.50
Agricultural malleable	9.00 to 9.50

Per Net Ton

Iron car axles	$11.50 to $12.00
Steel car axles	10.00 to 10.50
No. 1 railroad wrought	8.75 to 9.25
No. 2 railroad wrought	8.75 to 9.25

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$36.00
Cleveland	36.00
Chicago	37.00
Birmingham	39.00
Youngstown (del'd)	37.00

ALLOY STEEL BLOOMS, BILLETS AND SLABS

F.o.b Pittsburgh, Chicago, Buffalo, Massillon, Canton or Bethlehem.

Base price, $49 a gross ton except at Bethlehem, where it is $51.

CARBON STEEL FORGING INGOTS

F.o.b. Pittsburgh, Youngstown or Chicago.

Uncropped, $28 per gross ton.

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$3.75
Foundry, f.o.b. Connellsville Prompt	$4.25 to 5.25
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	10.50
Foundry, by-product, Newark or Jersey City, del'd.	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland delivered	9.27
Foundry, Birmingham	4.75
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.55 to $1.80
Mine run coking coal f.o.b. W. Pa.	1.80 to 2.00
Gas coal, ¾-in., f.o.b. Pa. mines	2.00 to 2.30
Mine run gas coal, f.o.b. Pa. mines	1.80 to 2.20
Steam slack, f.o.b. W. Pa. mines	1.30 to 1.40
Gas slack, f.o.b. W. Pa. mines	1.65 to 1.85

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.73c.
No. 5 industrial fuel oil	3.00c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.75c.
No. 4 industrial	5.50c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	45.00	40.00
New Jersey	55.00	43.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Chrome Brick

	Per Net Ton
Standard size	$45.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$65.00
Unburned, f.o.b. Baltimore	55.00
Grain magnesite, f.o.b Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

CAST IRON PIPE

	Per Net Ton
4-in. and larger, del'd Chicago	$44.00 to $45.00
4-in., del'd Chicago	47.00 to 48.00
6-in. and larger, del'd New York	43.00
4-in., del'd New York	46.00
6-in., and larger, Birmingham,	36.00 to 37.00
4-in. Birmingham	39.00 to 40.00

Class "A" and gas pipe, $3 extra.

No. 2 busheling	$4.00 to	$4.50
Locomotive tires, smooth	9.00 to	9.50
Pipe and flues	5.25 to	5.75
No. 1 machinery cast	9.50 to	10.00
Clean automobile cast	9.00 to	9.50
No. 1 railroad cast	9.00 to	9.50
No. 1 agricultural cast	8.00 to	8.50
Stove plate	7.00 to	7.50
Grate bars	6.50 to	7.00
Brake shoes	8.50 to	9.00

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.50 to	$12.00
No. 2 heavy melting steel	....	9.50
No. 1 railroad wrought	....	11.00
Bundled sheets	....	9.50
Hydraulic compressed, new	9.50 to	10.00
Hydraulic compressed, old	7.00 to	7.50
Machine shop turnings	....	7.50
Heavy axle turnings	....	10.00
Cast borings	5.50 to	6.00
Heavy breakable cast	11.00 to	11.50
Stove plate (steel works)	....	9.50
No. 1 low phos. heavy	14.50 to	15.00
Couplers and knuckles	14.00 to	14.50
Rolled steel wheels	14.00 to	14.50
No. 1 blast furnace	5.50 to	6.00
Spec. iron and steel pipe	9.50 to	10.00
Shafting	....	15.50
Steel axles	....	14.50
No. 1 forge fire	....	10.00
Cast iron car wheels	11.50 to	12.00
No. 1 cast	12.00 to	13.00
Cast borings (chem.)	12.00 to	14.00
Steel rails for rolling	....	13.00

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$9.50 to	$10.00
No. 2 heavy melting steel	9.00 to	9.50
Compressed sheet steel	9.00 to	9.50
Light bundled sheet stampings	6.50 to	7.00
Drop forge flashings	9.00 to	9.50
Machine shop turnings	8.00 to	8.25
Short shoveling turnings	7.75 to	8.25
No. 1 busheling	9.00 to	9.50
Steel axle turnings	7.50 to	8.00
Low phos. billet crops	12.50 to	13.00
Cast iron borings	7.75 to	8.25
Mixed borings and short turnings	7.75 to	8.25
No. 2 busheling	7.75 to	8.25
No. 1 cast	10.50 to	11.00
Railroad grate bars	6.50 to	7.00
Stove plate	7.50 to	8.00
Rails under 3 ft.	14.00 to	14.50
Rails for rolling	10.50 to	11.00
Railroad malleable	11.75 to	12.00
Cast iron carwheels	....	11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$10.50 to	$11.00
No. 2 heavy melting scrap	9.50 to	10.00
Scrap rails	9.50 to	10.00
New hydraul. comp. sheets	9.50 to	10.00
Old hydraul. comp. sheets	6.50 to	7.00
Drop forge flashings	9.50 to	10.00
No. 1 busheling	9.50 to	10.00
Hvy. steel axle turnings	8.50 to	9.00
Machine shop turnings	7.00 to	7.50
Knuckles and couplers	12.00 to	12.50
Coil and leaf springs	12.00 to	12.50
Rolled steel wheels	12.00 to	12.50
Low phos. billet crops	13.50 to	14.00
Short shov. steel turnings	7.50 to	8.00
Short mixed borings and turnings	7.50 to	8.00
Cast iron borings	7.00 to	7.50
No. 2 busheling	6.50 to	7.00
Steel car axles	12.00 to	12.50
Iron axles	11.00 to	12.00
No. 1 machinery cast	12.00 to	12.50
No. 1 cupola cast	10.50 to	11.00
Stove plate	9.25 to	9.75
Steel rails, 3 ft. and under	12.00 to	12.50
Cast iron carwheels	11.00 to	11.50
Industrial malleable	11.50 to	12.00
Railroad malleable	11.50 to	12.00
Chemical borings	9.00 to	10.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	....	$10.00
Scrap steel rails	....	9.00
Short shoveling turnings	....	5.50
Stove plate	$7.00 to	7.50
Steel axles	11.00 to	11.50
Iron axles	11.00 to	11.50
No. 1 railroad wrought	....	7.00
Rails for rolling	....	10.50
No. 1 cast	9.00 to	9.50
Tramcar wheels	9.00 to	9.50
Cast iron borings, chem	....	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$10.00 to	$10.50
No. 1 heavy melting	9.00 to	9.50
No. 2 heavy melting	8.25 to	8.75
No. 1 locomotive tires	8.00 to	8.50
Misc. stand.-sec. rails	10.50 to	11.00
Railroad springs	11.25 to	11.75
Bundled sheets	6.00 to	6.50
No. 2 railroad wrought	9.00 to	9.50
No. 1 busheling	6.50 to	7.00
Cast iron borings and shoveling turnings	4.50 to	5.00
Rails for rolling	10.75 to	11.25
Machine shop turnings	4.25 to	4.75
Heavy turnings	5.50 to	6.00
Steel car axles	10.75 to	11.25
Iron car axles	12.50 to	13.00
Wrot. iron bars and trans.	9.75 to	10.25
No. 1 railroad wrought	6.25 to	6.75
Steel rails less than 3 ft.	12.00 to	12.50
Steel angle bars	11.50 to	12.00
Cast iron carwheels	8.25 to	8.75
No. 1 machinery cast	8.50 to	9.00
Railroad malleable	8.50 to	9.00
No. 1 railroad cast	8.00 to	8.50
Stove plate	6.50 to	7.00
Relay rails, 60 lb. and under	16.00 to	16.50
Relay, rails, 60 lb. and over	$20.00 to	$21.00
Agricult. malleable	9.00 to	9.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$7.00 to	$8.00
Scrap T rails	7.00 to	8.00
Machine shop turnings	2.00 to	2.50
Cast iron borings	4.00 to	4.25
Bundled skeleton, long	5.50 to	6.00
Forge flashings	4.75 to	5.00
Blast furnace scrap	4.75 to	5.00
Shafting	9.00 to	9.50
Steel car axles	8.50 to	9.00
Wrought pipe	3.50 to	4.00
Rails for rerolling	6.00 to	6.50
Cast iron borings, chemical	7.50 to	8.00
Per gross ton delivered consumers' yards:		
Textile cast	$10.00 to	$10.50
No. 1 machinery cast	10.00 to	10.50
Stove plate	6.25 to	6.50
Railroad malleable	11.00 to	12.00

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$7.75 to	$8.00
No. 2 heavy melting steel	6.50 to	7.00
Heavy breakable cast	7.50 to	8.00
No. 1 machinery cast	8.00 to	8.50
No. 2 cast	6.50 to	7.00
Stove plate	5.00 to	5.50
Steel car axles	10.00 to	10.50
No. 1 railroad wrought	7.50 to	8.00
No. 1 yard wrought, long	$6.50 to	$7.00
Spec. iron and steel pipe	5.50 to	6.00
Forge fire	5.50 to	6.00
Rails for rerolling	8.00 to	8.50
Short shoveling turnings	3.00 to	3.50
Machine shop turnings	2.50 to	3.00
Cast borings	4.50 to	4.75
No. 1 blast furnace	2.50 to	3.00
Cast borings (chemical)	11.00 to	11.50
Unprepared yard iron and steel	3.50 to	4.00
Per gross ton, delivered local foundries:		
No. 1 machinery cast		$9.50
No. 1 hvy. cast (cupola size)		7.75
No. 2 cast		7.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$8.25 to	$9.00
Scrap rails for melting	9.00 to	9.50
Loose sheet clippings	5.25 to	5.75
Bundled sheets	6.25 to	6.75
Cast iron borings	6.25 to	6.75
Machine shop turnings	5.75 to	6.25
No. 1 busheling	6.50 to	7.00
No. 2 busheling	3.50 to	4.00
Rails for rolling	9.50 to	10.00
No. 1 locomotive tires	9.00 to	9.50
Short rails	11.75 to	12.25
Cast iron carwheels	8.25 to	8.75
No. 1 machinery cast	9.50 to	10.00
No. 1 railroad cast	9.00 to	9.50
Burnt cast	6.50 to	7.00
Stove plate	6.50 to	7.00
Agricultural malleable	8.50 to	9.00
Railroad malleable	9.00 to	9.50

DETROIT

Dealers' buying prices per gross ton:

Heavy melting steel	$8.25 to	$8.75
Borings and short turnings	6.00 to	6.50
Long turnings	5.50 to	6.00
No. 1 machinery cast	8.50 to	9.00
Automotive cast	9.75 to	10.25
Hydraul. comp. sheets	8.25 to	8.75
Stove plate	6.00 to	6.50
New factory busheling	6.75 to	7.25
Old No. 2 busheling	5.00 to	5.50
Sheet clippings	5.50 to	6.00
Flashings	6.75 to	7.25
Low phos. plate scrap	9.25 to	9.75

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$5.50	$5.50
Rails, scrap	6.00	4.50
Machine shop turnings	2.50	2.50
Boiler plate	4.50	4.50
Heavy axle turnings	2.50	2.50
Cast borings	3.00	3.00
Steel borings	2.00	2.00
Wrought pipe	2.50	2.50
Steel axles	4.50	6.00
Axles, wrought iron	4.50	6.50
No. 1 machinery cast	7.75	9.00
Stove plate	4.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	3.05c.
Structural shapes	3.05c.
Soft steel bars and small shapes	2.85c.
Reinforcing steel bars	3.00c.
Cold-finished and screw stock—	
Rounds and hexagons	3.20c.
Squares and flats	3.20c.
Hoops and bands, under ¼ in.	3.10c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.15c.
Galv. sheets (No. 24), 25 or more bundles	3.70c.
Hot-rolled sheets (No. 10)	2.85c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.32
Spikes, large	2.90c.
Small	2.65c.
Bolts	2.90c.
Track bolts, all sizes, per 100 count,	65 per cent off list.
Machine bolts, 100 count,	65 per cent off list.
Carriage bolts, 100 count,	65 per cent off list.
Nuts, all styles, 100 count,	65 per cent off list.
Large rivets, base per 100 lb.	$3.25
Wire, black, soft ann'l'd, base per 100 lb.	2.90
Wire, galv. soft, base per 100 lb.	3.35
Common wire nails, per keg	2.65
Cement coated nails, per keg	2.65

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 9999 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	2.90c.
Cold-fin. steel bars and shafting	
Rounds and hexagons	3.40c.
Flats and squares	3.40c.
Bands, 3/16 in. (in Nos. 10 and 12 gages)	3.20c.
Hoops (No. 14 gage and lighter)	3.20c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.30c.
Hot-rolled sheets (No. 10)	2.85c.
Spikes (9/16 in. and lighter)	3.50c.
Track bolts	4.65c.
Rivets, structural (keg lots)	3c.
Rivets, boiler (keg lots)	3.10c.
	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Coach and lag screws	60 and 5
Hot-pressed nuts, sq., tap. or blank	60 and 5
Hot-pressed nuts, hex., tap. or blank	60 and 5
Hex. head and cap screws	60
Cup point set screws	70
Flat head bright wood screws	37½ and 10
Spring cotters	50
Stove bolts in full packages	72½
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	$5.50 off list
No. 8 black ann'l'd wire per 100 lb.	$3.75
Com. wire nails, base per keg	2.70c.
Cement c't'd nails, base per keg	2.70c.

NEW YORK

	Base per Lb.
Plates	3.30c.
Structural shapes	3.27c.
Soft steel bars, small shapes	3.17c.
Iron bars	3.24c.
Iron bars, swed. charcoal	6.50 to 7.00c.
Cold-fin. shafting and screw stock; Rounds and hexagons	3.92c.
Flats and squares	4.42c.
Cold-roll. strip, soft and quarter hard	4.00c.
Hoops	3.42c.
Bands	3.42c.
Hot-rolled sheets (No. 10)	3.17c.
Hot-rolled ann'l'd sheets (No. 24*)	3.65c.
Galvanized sheets (No. 24*)	4.25c.
Long terne sheets (No. 24)	4.75c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.30c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel ⅛ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open hearth spring steel, bases	3.75c. to 10.00c.
Common wire nails, base, per keg	$3.00
	Per Cent
Machine bolt, cut thread:	Off List
¾ x 6 in. and smaller	60
1 x 30 in. and smaller	60
Carriage bolts, cut thread:	
½ x 6 in. and smaller	60
¾ x 20 in. and smaller	50
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST LOUIS

	Base per Lb.
Plates and struc. shapes	3.34c.
Bars, soft steel or iron	3.14c.
Cold-fin. rounds, shafting, screw stock	3.74c.
Hot-rolled annealed sheets (No. 24)	3.94c.
Galv. sheets (No. 24)	4.54c.
Hot-rolled sheets (No. 10)	3.19c.
*Black corrug. sheets (No. 24)	3.99c.
Galv. corrug. sheets	4.59c.
Structural rivets	3.59c.
Boiler rivets	3.69c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	60
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts	
1000 lb. or over	60
200 to 999 lb.	55 and 5
100 to 199 lb.	50 and 5
Less than 100 lb.	50

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	2.75c.
*Structural shapes	2.75c.
*Soft steel bars, small shapes, iron bars (except bands)	2.75c.
‡Reinforc. steel bars, sq. twisted and deformed	2.505c.
Cold-finished steel bars	3.73c.
*Steel hoops	3.30c.
*Steel bands, No. 12 to 3/16 in., incl.	3.05c.
Spring steel	5.00c.
†Hot-rolled annealed sheets (No. 24)	3.40c.
†Galvanized sheets (No. 24)	4.00c.
*Hot-rolled annealed sheets (No. 10)	2.95c.
Diam. pat. floor plates, ¼ in.	4.75c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For 5 tons or more, exclusive of cutting charge.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.21c.
Soft steel bars	2.90c.
Reinforc. steel bars	2.00c. to 2.50c.
Cold-finished steel bars	3.40c.
Flat rolled steel under ¼ in.	3.26c.
Cold-finished strip	5.55c.
Hot-rolled annealed sheets (No. 24)	3.76c.
Galvanized sheets (No. 24)	4.36c.
Hot-rolled sheets (No. 10)	3.01c.
Black ann'l'd wire, per 100 lb.	$2.45
No. 9 galv. wire, per 100 lb.	2.80
Com. wire nails, base per keg	2.45

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.30c.
Bars, soft steel or iron	3.10c.
New billet reinforc. bars	3.10c.
Rail steel reinforc. bars	3.10c.
Hoops and bands, 3/16 in. and lighter	3.35c.
Cold-finished bars	3.55c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.45c.
Hot-rolled sheets (No. 10)	3.10c.
Structural rivets	4.00c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, 1-in., per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$17.69
4-in.	41.23
Lap-welded steel boiler tubes, 2-in.	16.42
4-in.	38.31

BUFFALO

	Base per Lb.
Plates	3.27c.
Struc. shapes	3.15c.
Soft steel bars	2.95c.
Reinforcing bars	1.95c.
Cold-fin. flats and sq.	3.35c.
Rounds and hex.	3.25c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	4.00c.
Galv. sheets (No. 24)	4.15c.
Bands	3.32c.
Hoops	3.32c.
Hot-rolled unannealed sheets	3.07c.
Com. wire nails, base per keg	$3.00
Black wire, base per 100 lb.	3.25

BOSTON

	Per Lb.
Beams, channels, angles, tees, zees	3.42c.
H beams and shapes	3.42c.
Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	3.43c.
Floor plates, diamond pattern	5.18c.
Bar and bar shapes (mild steel)	3.25c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.50c. to 4.50c.
Half rounds, half ovals, ovals and bevels	4.50c.
Tire steel	4.50c.
Cold-finished rounds and hexagons	3.70c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.20c.
Blue annealed sheets, No. 10 ga.	3.25c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Galvanized steel sheets, No. 24 ga.	4.60c.
Lead coated sheets, No. 24 ga.	5.65c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U.M.	3.50c.	3.40c.	3.40c.
Shapes, standard	3.50c.	3.40c.	3.40c.
Wide-flanged beams and columns	3.70c.	3.60c.	3.60c.
Soft steel bars	3.55c.	3.40c.	3.40c.
Reinforcing bars	3.10c.	3.15c.	3.50c.
Hot-rolled annealed sheets (No. 24)	4.25c.	4.15c.	4.25c.
Hot-rolled sheets (No. 10)	3.75c.	3.65c.	3.65c.
Galv. sheets (No. 24)	4.85c.	4.75c.	4.85c.
Struc. rivets, ½ in. and larger	6.25c.	6.00c.	5.00c.
Cold finished steel Rounds	5.95c.	5.95c.	4.75c.
Squares and hexagons	7.20c.	7.20c.	6.00c.
Flats	7.70c.	7.70c.	7.00c.
Common wire nails —base per keg	$3.35	$3.25	$3.45
less carload			

All items subject to differentials for quantity.

Substantial Developments in Drilling and Boring Equipment During 1933

(*Concluded from Page* 24)

chine operates on five cylinder blocks at one time, and delivers a complete block every 28 sec.

Small Precision Boring Machines

THREE or more high precision automatic boring machines employing single-point tools, either diamond or cemented carbide, and designed to give high accuracy and high finish in boring non-ferrous metals, plastics, cast iron and certain soft steels, were brought out during the year.

One is a small, very compact machine for both small and large shops: in the former it is suitable for small and medium-size lots of a variety of parts, and in the large shops it is for production lines, where it may be advantageous to keep one machine set up for each individual job. Two boring heads can be mounted on the bridge. The capacity is for holes from about 5/16 to 4 in., and the boring stroke can be as much as 9 in. It has all the automatic features of the company's larger machines. The same company brought out a new precision wheelhead for both its boring and internal grinding machines. "Super" precision bearings held under a definite axial load eliminate radial slack and end-play and wear is taken up automatically. The spindle is supported in four rows of balls. Preload is held by springs and is not altered by expansion and contraction due to temperature variation. Naked, sleeve or quill type spindles can be furnished in a variety of sizes for speeds up to 38,000 r.p.m.

Single and double-end "junior" precision boring machines for use on connecting rods, gears, pistons, compressor bodies and the like, were introduced by another prominent builder. Features include compact design, full hydraulic control, and provision for taking both roughing and finishing cuts on aluminum, bronze, cast-iron and certain steel parts. One or two boring units can be mounted on the bridge of the single-end machine. Boring units with inbuilt motor directly connected with the spindle or with motor above or beside the spindle and driving by belt can be supplied.

In large boring machines, a new horizontal boring, drilling and milling unit is equipped with an auxiliary spindle having a speed of 1500 r.p.m. to permit efficient drilling or boring of even the smallest holes and the use of the smallest end mills. The main spindle is 3½ in. in diameter and runs at speeds up to 500 r.p.m. Each spindle has 36 speeds and 18 feeds. A separate milling feed gives 18 changes with directional control. Anti-friction bearings are employed throughout, and lubrication is automatic. Operation of the entire machine, including clamping of the spindle head and of the column, is controlled from a telescoping platform on which the operator stands.

No Sharp Drop in Buying Interest at Cincinnati

CINCINNATI, Jan. 9.—Despite the heavy shipments last month, consumers entered the market for a total of about 700 tons of pig iron during the past week. In addition, the volume of specifications against contracts approximated the movement just prior to the New Year, when consumers sought to complete old contracts before the cancellation date under the codes. Reports from the trade indicate that, after details incident to inventory taking and the determination of new policies have been settled, other consumers will be in the market for iron. Southern furnaces accounted for about 200 tons of the past week's business, while the remainder was sold by Northern producers. A southern Ohio melter bought 300 tons of Northern foundry iron for first quarter, but other business was in small lots. Inquiry is nil.

Coke

New business in foundry coke is limited to 30-day contracts, users being content to cover for determined needs rather than to anticipate business. Shipments continue at a level comparable with December.

Steel

The sheet steel market is without distinct trend, although demand continues to be steady around 30 per cent of capacity. Of course, with inventories still occupying a good deal of consumers' attention, it is still too early in the year to determine just what the tendency of the market will be.

Scrap

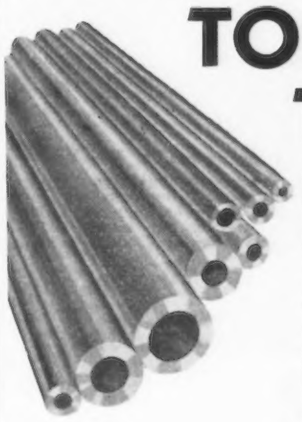
The scrap market is reacting sympathetically to strength in other areas, but mill buying is at a low ebb. In fact, the present movement of old materials is largely to yards, with a small amount being shipped on old contracts. Dealers continue to hold stocks for better prices. The Chesapeake & Ohio is offering a list of about 12,000 tons, including car scrap and rails.

Scrap Up at Detroit

DETROIT, Jan. 8.—Steel scrap prices have advanced 25c. to 75c. a ton as a result of speculative purchases by dealers. Heavy melting steel and hydraulic bundles are up 25c. a ton, while low phosphorus plate scrap has risen 75c. Dealers anticipate a relatively quiet market the remainder of the month.

NON-SHRINK, OIL HARDENING

TOOL STEEL TUBING



The job of making ring dies, cutting dies, bushings spacers, etc., is half done when you start with Bissett Tool Steel Tubing. There is a size carried in stock to meet every requirement up to 12" O.D. and 2" wall thickness. Larger sizes can be supplied.

It eliminates forging, does away with annealing difficulties and cuts down machining cost.

We also supply special tubing to S.A.E. 52100 and S.A.E. 4615 analysis for Ball Bearing purposes.

Manufacturers of BISCO Tungsten Carbide and Tantalum Carbide drawing dies for wire, rod and tubing.

THE BISSETT STEEL CO., INC.

945 E. 67th STREET, CLEVELAND, O.

Cincinnati Pittsburgh Buffalo

Consumers Remain Cautious as Spelter and Copper Quotations Weaken

Sellers Book Moderate Tonnages of Lead as Price Steadies at 3.90c., St. Louis—Straits Tin Inactive at 52c., New York

NEW YORK, Jan. 9.—Following a 25-point decline in the price of electrolytic copper yesterday, the market is again marking time pending definite code action. Custom smelters are currently disposing of a few tonnages of prompt and June metal at the new price of 8c. a lb., delivered Connecticut points, and producers continue out of the market because of their refusal to openly compete at a price below 9c. Mine producers are, however, covering the needs of affiliated units at prices under the 9c. figure. Of the diverse proposals which will be discussed at the forthcoming code colloquy, the attention of the trade is particularly concentrated on the points which would regulate market prices and prevent manufacturers from drawing on more than 25 per cent of their existing stocks.

During 1933 there was a 50 per cent advance in world copper production, but stock declines, mostly in America, totaled over 100,000 tons for the same period. With the exception of America the world's statistical position was not particularly bad at the turn of the year. The domestic situation, however, continues unattractive inasmuch as visible stocks exceed six months' current production, with little likelihood of any metal flowing abroad as holders prefer to retain their stocks, in the hope that a market rise may afford them the benefits of the 4c. import tariff.

Tin

Pool support of London quotations and firmer exchange rates are serving to reduce New York price fluctuations, but importers and brokers are unable to interest domestic users in important commitments. Some metal has been sold for delivery throughout the year, but current trading is spotty and of the carlot variety. During the first quarter sellers expect less demand from tin plate interests but look for a compensating demand from the motor industries. December deliveries into domestic consumption totaled 3130 tons, compared with 3350 tons in November. For the ten months ended Oct. 31, 1933, domestic consumption of tin was 52,251 tons, against 29,397 tons for the corresponding period in 1932.

Lead

When compared with other metals, the lead market during 1933 was decidedly orderly, but the inability of major producers to maintain a production-shipment balance the last three months has created some weakness in the current market. The recent price reduction served to attract some January tonnage, but the buying wave soon subsided and present trading is confined mostly to routine and miscellaneous carlots. The open market is quotably unchanged at 4c. a lb., New York, and 3.90c., St. Louis, for prompt and February positions. Somewhat more than 23,000 tons of December metal was sold by first hands, against 32,000 tons sold in November. As only about 20,000 tons of January metal has been booked, most sellers anticipate additional purchases of about 8000 tons for that month. It is expected that refinery reserves will show another increase of over 13,000 tons as a result of excessive smelter activity during December. Because of this progressive growth of stocks and the additional increases expected as a result of greater demand for by-product silver, buyers are generally becoming more cautious about forward purchases.

Zinc

Continued excessive Tri-State mine production and the eagerness of some sellers to obtain bookings forced spelter quotations down five points on Saturday. Prime Western is now 4.25c. a lb., East St. Louis, and 4.60c., New York, but consumers continue to maintain a conservative buying attitude. Sales last week rose to 4700 tons, and because of the low position of many consumers' stocks major sellers expect a substantial improvement in buying as soon as the market becomes firm. The estimated output of primary metallic zinc from domestic ores in 1933 was 307,200 tons, representing an increase of 48 per cent over the 207,148 tons produced in 1932. Apparent deliveries of primary slab zinc to domestic users in 1933 amounted to 336,000 tons, an increase of 58 per cent from the 213,280 tons reported for 1932. The 1933 deliveries represented more than 60 per cent of the annual average for the 1925-1929 period.

The Week's Prices. Cents Per Pound for Early Delivery

	Jan. 3	Jan. 4	Jan. 5	Jan. 6	Jan. 8	Jan. 9
Electrolytic copper, N. Y.*	8.00	8.00	8.00	8.00	7.25	7.25
Lake copper, N. Y.	8.25	8.25	8.25	8.25	8.00	8.00
Straits tin, Spot, N. Y.	52.80	52.70	52.50	....	52.00	52.00
Zinc, East St. Louis	4.30	4.30	4.30	4.25	4.25	4.25
Zinc, New York	4.65	4.65	4.65	4.60	4.60	4.60
Lead, St. Louis	3.90	3.90	3.90	3.90	3.90	3.90
Lead, New York	4.00	4.00	4.00	4.00	4.00	4.00

* Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98-99 per cent, 22.90c. a lb., delivered; New No. 12, 18.50c. a lb., delivered.
Aluminum, remelt No. 12 (alloy), carload lots delivered, 12c. a lb., average for week.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingots, 36c. a lb., delivered.
Antimony, 7.25c. a lb., New York.
Brass ingots, 85-5-5-5, 8.25c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits Pig	54.00c. to 55.00c.
Tin, bar	56.00c. to 57.00c.
Copper, Lake	9.50c. to 10.25c.
Copper, electrolytic	9.25c. to 9.75c.
Copper, castings	9.00c. to 10.00c.
*Copper sheets, hot-rolled	15.00c.
*High brass sheets	13.75c.
*Seamless brass tubes	16.25c.
*Seamless copper tubes	16.25c.
*Brass rods	12.25c.
Zinc, slabs	5.75c. to 6.75c.
Zinc sheets (No. 9), casks	9.75c. to 10.00c.
Lead, American pig	4.75c. to 5.75c.
Lead, bar	5.75c. to 6.75c.
Lead, sheets	8.00c.
Antimony, Asiatic	8.75c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	32.00c. to 33.00c.
Babbitt metal, commercial grade	25.00c. to 60.00c.

* These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	55.00c.
Tin, bar	57.00c.
Copper, Lake	9.125c. to 9.25c
Copper, electrolytic	9.125c. to 9.25c.
Copper, castings	8.15c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	5.00c. to 5.25c.
Lead, bar	8.00c.
Antimony, Asiatic	9.00c.
Babbitt metal, medium grade	19.50c.
Babbitt metal, high grade	59.00c.
Solder, ½ and ½	32.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.00c.	7.00c.
Copper, hvy. and wire	5.75c.	6.75c.
Copper, light and bottoms	4.75c.	5.50c.
Brass, heavy	3.25c.	3.75c.
Brass, light	2.75c.	3.25c.
Hvy. machine composition	4.37½c.	5.12½c.
No. 1 yel. brass turnings	4.12½c.	4.87½c.
No. 1 red brass or compos. turnings	3.87½c.	4.62½c.
Lead, heavy	3.00c.	3.625c.
Zinc	2.50c.	3.00c.
Cast aluminum	7.25c.	8.50c.
Sheet aluminum	11.25c.	12.75c.

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And then a workman will walk over and nudge a control button, or the roller will study his schedule—which will remind you that there must be many variables to keep co-ordinated, that no ordinary crew of workmen could get the best out of such tremendous machinery. The better the mill the better the men must be.

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Bars Rivets Billets

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Fabricated Structural Steel

Awards in Good Volume—New Projects Light

INCLUDING 11,650 tons for bridges at Sagamore and Bourne, Mass., across Cape Cod Canal, lettings, at 30,140 tons, are the largest since the middle of November. Two awards of 1500 tons each were for the Montgomery Island Dam at Beaver, Pa., and a building for the Calco Chemical Co., Bound Brook, N. J. New projects were extremely light, calling for only 5800 tons. The largest inquiries are 1850 tons for a dam at Castlewood, Colo., and 1000 tons for the Calvert Street bridge, Washington. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

State of Maine, 145 tons, East Outlook bridge, to New England Structural Co.

Sagamore-Bourne, Mass., 11,650 tons, two government bridges, to American Bridge Co.

Medford, Mass., 400 tons, State bridge over Mystic River, to Boston Bridge Works, Inc.

North Adams, Mass., 200 tons, State bridge, to an unnamed fabricator.

Stoughton, Mass., 125 tons, State bridge to Boston Bridge Works, Inc.

Bergen County, N. J., 120 tons, State highway bridge, to American Bridge Co.

Pennsylvania Railroad, 850 tons, grade crossing elimination at East Aurora, N. Y., to Mount Vernon Bridge Co.

Bound Brook, N. J., 1500 tons, Calco Chemical Co. building, to Harris Structural Steel Co.

Beaver, Pa., 1500 tons, Montgomery Island Dam bridge and gates, to Independent Bridge Co.

Baltimore, 225 tons, Black River sewage disposal plant, to Dietrich Brothers.

Washington, 250 tons, two Coast Guard cutters for West Coast, to Charlestown Navy Yard.

THE SOUTH

Amsello, Md., 1040 tons, factory addition for Celanese Corpn. of America, to McClintic-Marshall Corpn.

Curtis Bay, Md., 200 tons, several buildings for E. I. du Pont de Nemours & Co., to Bethlehem Fabricators, Inc.

Columbia, S. C., 500 tons, stadium, to Virginia Bridge & Iron Co.

Pensacola, Fla., 800 tons, Government hangars, to an unnamed fabricator.

Norris Dam, Tenn., 730 tons, cable-way towers for Tennessee Valley project, to an unnamed fabricator.

Flat, Tex., 100 tons, underpass, to Virginia Bridge & Iron Co.

CENTRAL STATES

Cleveland, 515 tons, sheet steel piling for Coast Guard station, to Carnegie Steel Co.

Burlington, Iowa, 1200 tons, dam across Mississippi River, to R. C. Mahon Co.

Waterloo, Iowa, 1100 tons, State highway project, to Omaha Steel Works.

Lynville, Wis., 1200 tons, Lock No. 9, to McClintic-Marshall Corpn.

State of Missouri, 175 tons, bridges, to St. Joseph Structural Steel Co.

Kansas City, Mo., 1250 tons, Seventh Street viaduct, to Kansas City Structural Steel Co.

St. Louis, 100 tons, addition to Chevrolet Motor Co. building, to Atlas Iron Works, St. Louis.

Osborne County, Kan., 205 tons, highway bridge, to Kansas City Structural Steel Co.

Cherokee County, Kan., 450 tons, highway bridge, to Missouri Valley Bridge & Iron Co.

State of Kansas, 110 tons, highway bridge between Ellsworth and Washington counties, to St. Joseph Structural Steel Co.

Ford County, Kan., 450 tons, highway bridge, to Kansas City Structural Steel Co.

Norfolk, Neb., 220 tons, girder spans, to Lincoln Steel Works.

Omaha, Neb., 150 tons, viaduct, to Omaha Steel Works.

State of Nebraska, 1100 tons, bridge across Elkhorn River, to Omaha Steel Works.

WESTERN STATES

Logan County, Colo., 135 tons, State overhead crossing, to an unnamed bidder.

La Veta, Colo., 125 tons, railroad viaduct, to American Bridge Co.

Morrison, Colo., 100 tons, bridge to Pittsburgh-Des Moines Steel Co.

Wyola, Mont., 300 tons, bridge, to American Bridge Co.

Mare Island, Cal., 200 tons, two cranes for Navy Yard, to Lakeside Bridge & Steel Co.

State of Oregon, 210 tons, highway work in nine counties, to unnamed bidders.

Fort Mason, Cal., 315 tons, pier No. 1 extension, to Ingalls Iron Works.

Fort Lewis, Wash., 150 tons, grain warehouse, to Isaacson Iron Works.

Signal Hill, Cal., 110 tons, city hall, to McClintic-Marshall Corpn.

Albrook Field, Canal Zone, 420 tons, airplane hangar and operations building, to an unnamed bidder.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Washington, 1000 tons, Calvert Street bridge.

CENTRAL STATES

Escanaba, Mich., 130 tons, Tula-Gogebic highway span; bids close Jan. 12.

Battle Creek, Mich., 400 tons, building.

State of Illinois, 400 tons, highway bridges.

Bellevue, Iowa, 1450 tons sheet piling, dam across Mississippi River.

Dubuque, Iowa, 950 tons of structural and 1250 tons of sheet piling. Lock No. 11; bids Jan. 11 by United States Engineer's Office, Rock Island, Ill.

Guttenberg, Iowa, 930 tons of structural and 1400 tons of sheet piling, Lock No. 10; bids to be opened Jan. 30 by United States Engineer's office, Rock Island, Ill.

WESTERN STATES

Castlewood, Colo., 1850 tons, dam.

Denver, 430 tons, siphon bridge on Owyhee project; bids Jan. 15.

Oakland, Cal., 3500 tons sheet piling, bulkhead for Coast Guard at Government Island, M. B. McGowan low bidder on general contract.

San Francisco, 150 tons, Golden West brewery; bids soon.

Coos County, Ore., 110 tons, State bridge over South Slough; bids Jan. 18.

State of Oregon, 135 tons, highway structures in three counties; bids Jan. 18.

Seattle, 950 tons, Fourth Avenue viaduct.

Fort Lewis, Wash., 200 tons, six gun sheds at Army Base; bids under advisement.

FABRICATED PLATE

AWARDS

Warners, N. J., 250 tons, tanks for Warner-Quinlan Co., to Hammond Iron Works.

Washington, 750 tons, two Coast Guard cutters for West Coast, to Charlestown Navy Yard.

Los Angeles, 150 tons, conduit forms for Metropolitan Water District, to an unnamed bidder.

NEW PROJECTS

Lexington, Mass., 150 tons, water tank.

Norfolk, Mass., 100 tons, water tank for state.

Kaukauna, Wis., closes bids Jan. 12 on one 250,000-gal. water tank.

Denver, 900 tons, pipe for Snivley and Owyhee River siphons; bids Jan. 15.

Hamilton Field, Cal., 100 tons, gasoline storage system at Army Air Base; bids under advisement.

Southern Pacific to Buy 25,000 Tons of Rails

SAN FRANCISCO, Jan. 8.—The Southern Pacific Co. is taking bids soon on 25,000 to 40,000 tons of rails. Bids will be taken Jan. 15 at Denver by the Bureau of Reclamation for a siphon bridge on the Owyhee project in Oregon. With $14,000,000 allocated to San Francisco, bids should be taken soon on the first units of a water system project which will require 17,000 tons of cast iron pipe.

At Oakland, Cal., bids have been taken for a bulkhead at Government Island, which calls for 3500 tons of structural steel and sheet piling.

No outstanding structural steel tonnage was placed during the week. The Pacific Coast Steel Corpn. took 650 tons of reinforcing bars for fleet moorings at the Navy Base at Pearl Harbor, T. H. At Denver the Bureau of Reclamation awarded 400 tons of reinforcing to the Inland Steel Co. Gunn-Carle Co. took 100 tons for quarters at the bombing base at Hamilton Field, Cal. Awards aggregated 2421 tons of structural steel, 1573 tons of reinforcing bars and 900 tons of plates.

There was a 35 per cent increase in bookings of major projects on the Pacific Coast during 1933 over tonnages placed in 1932. The reinforcing market has shown the greatest proportionate gain, with lettings of 81,339 tons in 1933 as compared to 55,340 tons for 1932. Structural steel awards totaled 258,338 tons during 1933 as against 186,046 tons for the previous year. Plates were less active and showed a loss. Approximately 76,969 tons was placed during 1932 and but 55,974 tons was booked last year. Cast iron pipe awards were practically identical for the two years. Tonnages for the two San Francisco bridges and for various Government projects during the last quarter constituted a major part of the gain. Industrial awards during the last half of the year showed an increase.

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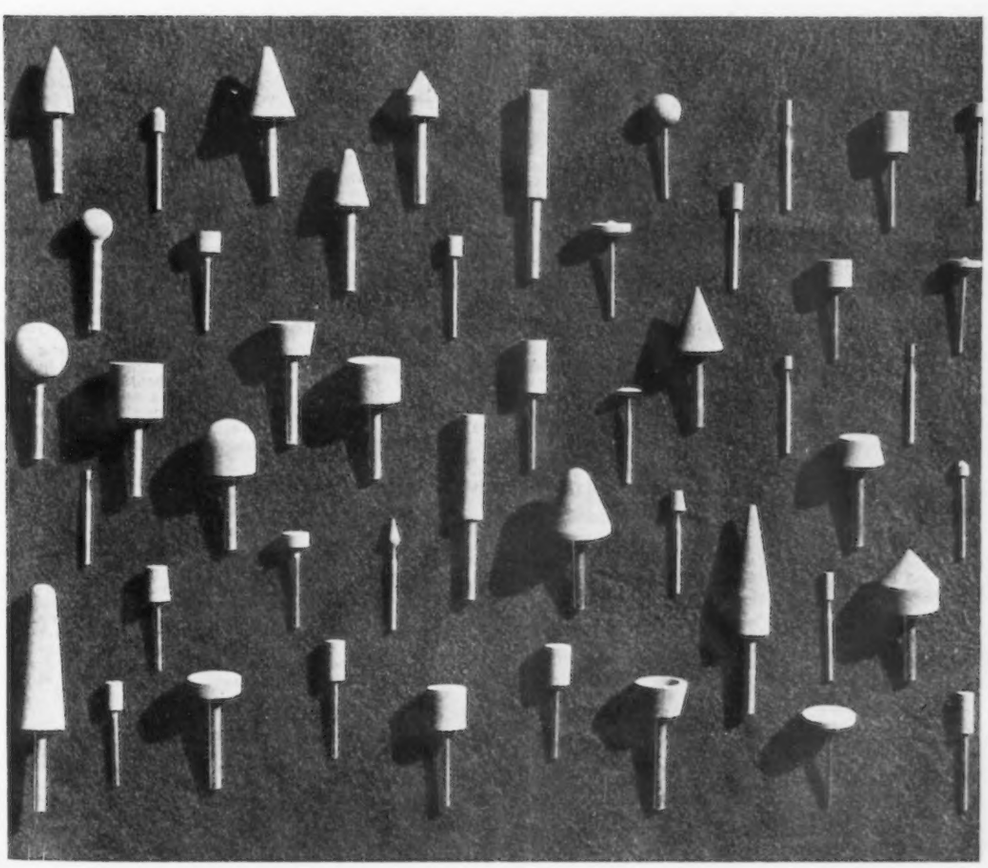

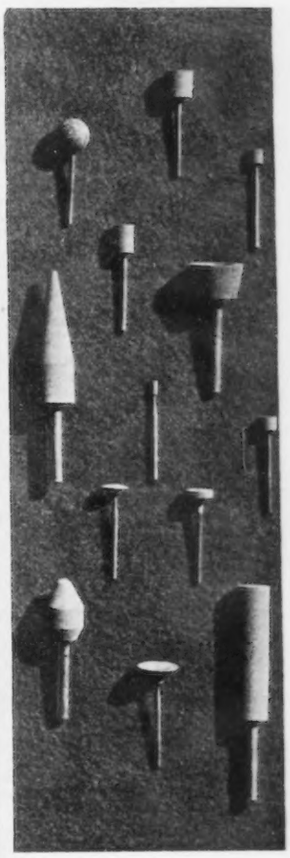

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PLANT EXPANSION AND EQUIPMENT BUYING

NEW ENGLAND

W. F. Webster Cement Co., 19 Charles Street, Cambridge, Mass., manufacturer of roofing cements, has acquired factory at 224 Thorndike Street, for new works, expanding present capacity.

Van Norman Machine Tool Co., 160 Wilbraham Street, Springfield, Mass., manufacturer of machine tools, parts, etc., has let general contract to G. P. Sampson, Springfield, for one-story addition.

Board of Selectmen, Windsor, Conn., plans manual training department in new two-story high school. Cost about $100,000. C. D. Adams, 71 Preston Street, is architect.

Board of Selectmen, Foxboro, Mass., plans installation of electric pumping machinery and auxiliary equipment for municipal water system. F. Burton Mitchell, Foxboro Co., Foxboro, is engineer.

Brake Gage Mfg. Co., Inc., Malden, Mass., has been organized by Ernest E. Sonier and Samuel Shiff, 31 Mount Vernon Street, to manufacture mechanical equipment and parts.

NORTH ATLANTIC

Commercial Solvents Corpn., 230 Park Avenue, New York, will carry out expansion and improvements at grain alcohol plant, Terre Haute, Ind., to cost about $400,000 with equipment. General contract has been let to Glenn North Construction Co., Terre Haute, for new one-story units, including improvements in present structures. Company has taken over two buildings formerly occupied by Terre Haute Paper Co., for storage and distribution, with gross capacity of 40,000 gal.

Superintendent of Lighthouses, St. George, Staten Island, N. Y., asks bids until Feb. 5 for 24 flasher mechanisms for electric lights, with adapters (Proposal 45181).

Green Fuel Economizer Co., Inc., Beacon, N. Y., has been organized by Allan and Ernest Davies, Scarsdale, N. Y., and Beacon respectively, and associates, capital $1,000,000, to manufacture fuel economizers, mechanical fans, dust-collecting systems, etc. New organization will take over local company of same name.

Kings Brewery, Inc., Throop Avenue and Pulaski Street, Brooklyn, has been purchased by new interests, headed by Samuel Rosoff. Extensions and improvements will be made in four-story plant, to include new equipment. Cost over $50,000 with machinery. Shampan & Shampan, 26 Court Street, are architects.

New York Power & Light Corpn., Albany, N. Y., plans transmission line at Carmel, N. Y., and vicinity. Cost over $40,000.

Mathieson Alkali Works, Inc., 250 Park Avenue, New York, manufacturer of caustic soda, soda ash and kindred products, has authorized following plant units at new works on 1000-acre tract near Lake Charles, La.: Soda ash plant, $2,182,000; caustic soda works, $870,000; lime stone plant, $777,000; power plant, waterworks pumping stations, pipe lines, etc., $940,000; brine supply, including 20-mile steel pipe line from oil field district at Hackberry, La., $545,000. Entire plant will cost about $5,000,000 with equipment. Stone & Webster Engineering Corpn., 90 Broad Street, New York, engineer, will supervise construction; Trump Corpn., Engineering Department, Chimes Building, Syracuse, N. Y., is consulting engineer.

Irving Rosenthal, 2404 Avenue O, Brooklyn, has filed plans for seven tanks with auxiliary equipment for bulk oil storage and distribution at Glendale, L. I. Cost $100,000. C. W. and George L. Rapp, Paramount Building, New York, are architects.

Adams Automatics, Inc., New York, has been organized by Charles F. Adams, 30 Church Street, and Richard Cogliati, 108-25 Thirty-seventh Drive, Corona, L. I., to manufacture automatic machinery and parts.

Penn-Marland Corpn., affiliated with National Distillers Products Corpn., 52 William Street, New York, has leased about 36,700 sq. ft. in eight-story building at Grove, Sixteenth to Eighteenth Streets, Jersey City, N. J., for new liquor rectifying and blending works.

Board of Education, New York, has filed plans for new three-story high school, 270 x 420 ft., at Bayside, L. I., to include manual training department. Cost $1,300,000. Walter C. Martin, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect.

Borough Council, Roselle, N. J., plans new municipal electric light and power plant, central steam power station for heating, extensions and improvements in municipal waterworks and pumping plants. Cost about $1,200,000 with equipment. Financing is being arranged.

Morris Basin Dry Docks Co., foot of Henderson Street, Jersey City, N. J., plans new machine and metal-fabricating shops, pier structures for new overhead traveling cranes, and other terminal units for construction and repair service. Cost $500,000 with equipment. Financing is being arranged, work to begin early in spring. Percy E. Barbour, 76 Beaver Street, New York, is engineer.

West Bergen Iron Foundry, Inc., Jersey City, N. J., has been organized by Frederick J. and John F. Powell, Jersey City, capital $125,000, to manufacture metal castings. Company will take over organization of same name at 21 Pollock Avenue.

Atlantic City Electric Co., Atlantic City, N. J., plans new transmission line to Hammonton, N. J., and vicinity. Cost over $45,000.

General American Tank Storage & Terminal Co., 122 East Forty-second Street, New York, plans new bulk oil storage and distributing terminal near Post Boulevard, East Rahway, N. J., including three 80,000-bbl. tanks, two 20,000-bbl. tanks and auxiliary equipment. Cost over $60,000.

National Airoil Burner Co., 1327 West Girard Avenue, Philadelphia, manufacturer of oil burners and oil-burning equipment, has acquired factory at 1234-56 Sedgley Avenue, totaling 40,000 sq. ft. floor space, for new main plant, concentrating production at that location.

Quaker City Brewing Corpn., Boston and Trenton Avenues, Philadelphia, will take bids soon for extensions and improvements, including new equipment. Cost about $50,000. Company recently arranged for stock issue of $256,250 for this and other expansion. Joseph D. Weiss, 119 West Fifty-seventh Street, New York, is architect.

Board of Education, Williamsport, Pa., will begin superstructure soon for second unit of new industrial shops at senior high school. Plans are under way for third unit. Cost over $40,000 with equipment.

WASHINGTON DISTRICT

Procurement Division, Treasury Department, Washington, has arranged appropriation of $1,750,000 for addition to local Federal warehouse, totaling about 400,000 sq. ft. floor space, with equipment. Supervising architect's office in charge.

Common Council, Galax, Va., is arranging fund of $365,000 through Federal aid for municipal hydroelectric power plant on New River and standby power plant in city for auxiliary service, using Diesel engine units; also for transmission line and two main power substations. Wiley & Wilson, Lynchburg, Va., are consulting engineers.

Water Bureau, Wolfe and Oliver Streets, Baltimore, plans new pumping station unit at Ashburton. Cost about $39,000 with equipment. Financing is being arranged.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 16 for four electric hoists and brakes, with spare parts (Schedule 1504) for Portsmouth, N. H., Navy Yard; metallic ladder treads (Schedule 1151) for San Diego, Sewall's Point, Mare Island and other yards; sharpening stones (Schedule 1514) for Eastern and Western yards.

Three Centuries Distillers, Inc., Philadelphia, recently organized, has leased building at 934 South Lakewood Avenue, Baltimore, for new rectifying, blending, storage and distributing plant.

Town Council, Covington, Va., has applied for Federal loan for $402,065 for new municipal electric light and power plant, and plans to begin work soon. Wiley & Wilson, Richmond and Lynchburg, Va., are consulting engineers.

SOUTH ATLANTIC

Fort Pierce Development Co., Fort Pierce, Fla., plans new multi-story precooling and cold storage plant for citrus fruit. Cost $380,000 with machinery. Financing has been arranged through Federal aid and work will soon begin. Capt. F. M. Upton is head.

Common Council, Mount Pleasant, S. C., plans installation of pumping machinery and auxiliary equipment, elevated steel tank and tower of 100,000-gal. capacity, pipe lines, etc., for new municipal water system. Fund of $75,000 is being arranged.

McClaren Rubber Co., West Trade Street, Charlotte, N. C., manufacturer of automobile tires, tubes, etc., plans installation of new equipment.

City Water Commission, Spartanburg, S. C., R. B. Simms, superintendent of waterworks, plans new municipal hydroelectric light and power plant on Pacolet River in connection with flood control project, including transmission line to city, about seven miles distant. Financing for $630,000 is being arranged.

City Council, DeLand, Fla., is considering erection of new municipal electric light and power plant. Cost about $350,000 with equipment. Federal financing is being arranged.

WESTERN PENNA.

Pittsburgh Plate Glass Co., Pittsburgh, has superstructure under way on three-story addition to plant of Duplate Division, Creighton, Pa., for manufacture of safety glass. Cost over $200,000 with equipment. Company has acquired building at 435 Madison Street, Memphis, Tenn., formerly occupied under lease, and will expand for factory branch, storage and distributing plant. Cost about $30,000.

Pitt Investment Co., Uniontown, Pa., recently organized, has taken over former brewery of Fayette Brewing Co., and will remodel for new distilling plant. Cost over $100,000 with equipment.

Ruffs Dale Distillery, Ruffs Dale, Pa., formerly known as Dillinger Distillery, is carrying out expansion and modernization program, to include new equipment. Cost over $50,000 with machinery.

BUFFALO DISTRICT

Chevrolet Motor Co., Buffalo, has filed plans for one-story addition to local assembling works for cars and trucks. Cost about $35,000 with equipment.

Consolidated Aircraft Corpn., 2050 Elmwood Avenue, Buffalo, has secured contract from Navy Department for 21 flying boats and spare parts, totaling $1,992,000, and is arranging for capacity production. Company plans erection of new multi-unit plant at Lindbergh Field, San Diego, Cal., to cost over $600,000.

Board of Education, Jamestown, N. Y., plans installation of manual training equipment in new two-story central high school and additions to three present junior high schools. Plans also are under way for new industrial building for equipment service. Financing for $1,220,000 has been arranged for entire work.

SOUTH CENTRAL

McCulloch's Green River Whiskies, Inc., Owensboro, Ky., recently organized, has acquired about 20 acres near city on Ohio River, for new plant, including power house, pumping plant, machine shop and other structures. Cost over $250,000 with machinery. Company is arranging stock issue for $720,000, part of fund to be used for purpose noted. L. Freeman Little, Owensboro, is vice-president; J. Wendell McCulloch, Bowling Green, Ky., is secretary and treasurer.

Mueller Co., Decatur, Ill., manufacturer of plumbing goods, brass products, etc., has let general contract to Austin Co., Cleveland, for new one-story machine shop, 90 x 300 ft., at Columbian Iron Works, Chattanooga, Tenn., lately acquired. Cost about $50,000 with equipment. This will be part of expansion program recently announced to cost $180,000 with machinery.

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Common Council, Hartselle, Ala., plans installation of centrifugal pumping machinery and other equipment, pipe lines, etc., for municipal waterworks and sewage disposal plant. Cost $88,500. Financing will soon be arranged. John M. Gilfillan, 617 North Tenth Street, Birmingham, is consulting engineer.

City Council, Columbia, Tenn., plans electric transmission line for use of Government power from Muscle Shoals, Ala., hydroelectric power plant, with local light and power distribution system and power substations. Cost $340,000. Application has been made for Federal loan.

Great Southern Distilling Co., Inc., Chartres and Piety Streets, New Orleans, has plans for additions for storage and distribution, and improvements in present plant, including equipment. Cost over $75,000 with machinery.

MICHIGAN DISTRICT

Chevrolet Motor Co., 3044 West Grand Boulevard, Detroit, has let general contract to Houglid Construction Co., Flint, Mich., for one-story addition to plant at Flint, 52 x 260 ft., for inspection and operating service.

Board of Education, Ionia, Mich., plans manual training department in new high school. Cost $250,000 with equipment. Financing is being arranged.

Henry Kohner, 9431 McQuade Street, Detroit, architect, has plans for new one and four-story distillery near city, with power house, storage and distributing buildings and other structures, for company whose name is temporarily withheld. Cost over $125,000 with equipment.

Metro-Metal Mfg. Co., 1326 East Woodridge Street, Detroit, has been organized by A. W. Schostak, 3311 West Chicago Boulevard, and associates, to manufacture steel and special metal products.

Trenton Valley Distillers Corpn., Trenton, Mich., is making extensions and improvements in former factory of Story Parchment Co. to include equipment for new distilling plant. Plans are under way for three-story addition, 100 x 100 ft., for storage and distribution. Entire project will cost over $100,000 with machinery. Company was organized recently with capital of $550,000. A. K. Davis is head.

MIDDLE WEST

Village Council, Peoria Heights, Ill., plans installation of electric pumping machinery and auxiliary equipment, pipe lines, etc., for new water supply system. Cost about $85,000. Financing is being arranged. W. P. Backes, Peoria, Ill., is engineer.

Automatic Air-Conditioning Corpn., 3231 West North Avenue, Chicago, has been organized by Len Ivey and Arthur H. Dost, to manufacture air-conditioning equipment and systems.

City Water and Light Department, 320 West First Street, Duluth, Minn., E. W. Kelly, manager, is arranging financing through Federal aid for $3,300,000 for new municipal steam power plant and central heating system in East End district.

Blue Creek Power & Irrigation District, Lewellen, Neb., care of E. E. Richards, Oshkosh, Neb., attorney, recently organized, plans new hydroelectric generating plant on Blue Creek, near Lewellen, with transmission lines and substations, in connection with irrigation system in parts of Morrill, Garden and Keith counties. Entire project will cost about $400,000. Financing is being arranged by Federal loan.

Sanitary District No. 1, Lincoln, Neb., office of secretary, plans new pumping plant with daily capacity of 12,000,000 gal., screening equipment, clarifiers, sludge machinery, tanks and other equipment for addition to sewage disposal works. Cost $338,450. Financing is being arranged. Scott & Scott, Bankers Life Building, are consulting engineers.

City Council, Iowa City, Iowa, has engaged Walter E. Schwob, 111½ East Washington Street, consulting engineer, to draw plans for new municipal electric light and power plant. Cost about $800,000 with equipment. Financing will soon be arranged.

Gillette Rubber Co., 779 Wisconsin Street, Eau Claire, Wis., has plans for a power plant extension, 32 x 50 ft., to cost $50,000 with equipment.

Protexel Co., Ironwood, Mich., which recently developed an automatic air conditioning unit for transportation and warehousing of tropical fruit, has contracted with Moe Brothers Mfg. Co., 319 East Clybourn Street, Milwaukee, for manufacture of device.

City Council, Adams, Wis., has commissioned A. E. McMahon Engineering Co., Menasha, Wis., to prepare plans for proposed $100,000 waterworks and sewage disposal plant project for which Federal aid is being sought. Walter Werner is mayor.

OHIO AND INDIANA

Euclid Brewing Co., Cleveland, recently organized, care of A. E. Keller, 2570 Overbrook Road, architect, has plans for new three and four-story plant, 107 x 180 ft., and will begin work early in spring. Cost about $350,000 with equipment.

General Air Conditioning Corpn., Kent, Ohio, recently organized by D. S. Sawyer and Charles Gougler, Kent, and associates, plans early establishment of local plant for manufacture of air-conditioning equipment and parts.

Libbey-Owens-Ford Glass Co., Nicholas Building, Toledo, Ohio, manufacturer of sheet glass, safety glass, etc., has let general contract to A. Bentley & Sons Co., Toledo, for one-story addition to plant at Rossford, 144 x 348 ft., for storage and distribution. Cost about $250,000 with equipment.

Board of Public Works, City Hall, Columbus, Ohio, plans two new refuse incinerator plants, each three stories and basement, 48 x 68 ft. Cost about $160,000 with equipment. Erwin Rosbach, City Hall, is architect.

Hudepohl Brewing Co., 40 East McMicken Street, Cincinnati, has plans for four-story and basement addition, 56 x 76 ft., for storage and distribution. Cost about $60,000 with equipment. Jacob J. Rueckert, Ingalls Building, is architect.

Village Council, Louisville, Ohio, plans installation of electric pumping machinery and auxiliary equipment, elevated storage tank of 300,000-gal. capacity, pipe lines, etc., for new municipal water system. Fund of $55,000 has been arranged.

Reeves Mfg. Co., Dover, Ohio, manufacturer of sheet metal products, plans one-story addition, 150 x 300 ft. Cost about $100,000 with equipment.

Common Council, Larue, Ohio, plans new municipal electric light and power plant. Cost $49,000 with equipment. Federal financing is being arranged.

Town Council, Cicero, Ind., plans new municipal electric light and power plant. Cost over $70,000 with equipment. Thomas N. Wynne, 211 East North Street, Indianapolis, is consulting engineer.

Auburn Automobile Co., Auburn, Ind., is making improvements in tool and die divisions, to include new equipment for 1934 car models. Cost about $1,000,000.

PACIFIC COAST

Pacific Coast Pulp & Paper Corpn., Richvale, Cal., manufacturer of boxboard and paper products, is arranging for stock issue of $563,500, part of fund to be used for paper and pulp mill construction and equipment.

Salton Sea Chemical Co., Brawley, Cal., will soon begin erection of new plant for manufacture of dry ice. Cost about $75,000 including steel pipe line for natural gas, now under way. Carl Einhart is general manager.

Board of City Trustees, Eureka, Cal., has been authorized to arrange bond issue of $1,134,000 for new water supply from Mad River, including dam, pumping stations, pipe lines, etc. Financing will be carried out through Federal aid. C. C. Kennedy, Call Building, San Francisco, is engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 16 for 10 motor-driven sensitive drills (Schedule 1513), 21 electric grinders (Schedule 1516), for Mare Island and Puget Sound navy yards; motor-driven bench milling machine (Schedule 1503), sand-blast cabinet (Schedule 1507), two motor-driven radial drills (Schedule 1502), for San Diego yard; 34 valve reseating outfits (Schedule 1515) for Mare Island yard.

Golden Age Breweries, Inc., Spokane, Wash., operating at former Schade Brewery, is carrying out expansion and improvements and will install additional equipment. Plans are being considered for new multi-story malting unit, to cost about $100,000 with equipment.

City Council, Coeur d'Alene, Idaho, plans new municipal electric light and power plant and waterworks system, with pumping station, pipe lines, etc. Bonds of $600,000 have been authorized and financing will soon be arranged.

Ellensburg Brewing Co., Ellensburg, Wash., plans expansion and improvements, including one and two-story additions, 37 x 90 ft., and 55 x 86 ft. respectively, with equipment to more than double present capacity. George Schraubstadter is general manager.

Northwest Distilleries, Inc., 1733 Westlake Street, Seattle, Barney B. Lustig, president, has let general contract to Henrikson-Alstrom Construction Co., Textile Tower Building, for remodeling two-story building at location noted, recently acquired for new distillery. A one-story addition will be built. Cost about $100,000 with machinery. Carl Siebrand, 5016 Twenty-first Street, N. E., is architect.

SOUTHWEST

Finkbeiner Packing Co., Third and Mulberry Streets, Pine Bluff, Ark., meat packer, has let general contract to M. O. Branton, Little Rock, Ark., for new one-story plant, 150 x 175 ft. Cost over $40,000 with equipment.

City Council, Independence, Mo., plans extensions and improvements in municipal electric light and power plant, including 3000-kw. turbo-generator and auxiliary equipment. Cost about $125,000. Financing is being arranged. Black & Veatch, Mutual Building, Kansas City, Mo., are consulting engineers.

City Council, Pauls Valley, Okla., plans new municipal electric light and power plant. Cost $256,000 with equipment. Federal financing is being arranged.

Common Council, McPherson, Kan., plans municipal electric light and power plant, using Diesel engine-generator units. Cost $210,500. Financing is being arranged. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Board of Water Commissioners, Excelsior Springs, Mo., plans installation of pumping machinery and auxiliary equipment, pipe lines, control equipment, etc., for mineral water development and supply. Total cost $874,000 with equipment. Financing will soon be arranged. Keene & Simpson, Land Bank Building, and Black & Veatch, Mutual Building, both Kansas City, Mo., are architects and consulting engineers, respectively.

City Council, Washington, Mo., plans a municipal gas plant. Cost about $70,000 with equipment. Financing is being arranged through Federal aid. George E. Wells, Security Building, St. Louis, is consulting engineer.

Fort Worth Steel & Machinery Co., Fort Worth, Tex., plans rebuilding storage and distributing plant recently destroyed by fire. Loss about $40,000 with equipment.

Rhenstrom Aircraft, Inc., Fort Worth, Tex., E. G. Rhenstrom, head, recently organized, plans new works for production of all-metal, popular-priced airplanes, particularly monoplane types, including parts and assembling. New units will sell for about $700 each. New plant will cost over $45,000 with equipment. Mr. Rhenstrom was formerly chief of technical staff of Southern Air Transport, Inc., and manager of operations of former Texas Air Transport, Inc.

FOREIGN

Administrative Board of the Capital, J. Benitez Castano, city manager, San Juan, Puerto Rico, asks bids unail Jan. 30 for hydrants, pipes, valves, etc., for water system; also for complete equipment for addition to filtration plant at Guaynabo.

Bakelite Corpn., 247 Park Avenue, New York, manufacturer of insulating products, etc., plans addition to works at Birmingham, England. Cost over $125,000 with equipment.

English Steel Corpn., Ltd., London, England, plans extensions and improvements in Vickers plant at Sheffield, England, including additions to drop stamping and heat-treating divisions. New open-hearth furnace will be built, making a battery of four such units. Fund of £500,000 (about $2,535,000) is being arranged for work.

Refractories for use in cupolas are discussed by C. E. Bales, vice-president, Ironton Fire Brick Co., Ironton, Ohio, in a bulletin of the American Refractories Institute, Pittsburgh. The author touches on the methods of manufacture, means of obtaining longer service from the cupola lining and the composition of two mixes recommended for daubing to prolong the life of a partly burned-out lining.

Products Index

VALVES—Pump, Rubber
Garlock Packing Co., The, Palmyra, N. Y.

VISES
Jarecki Mfg. Co., Erie, Pa.

WASHERS—Iron or Steel
Central Iron & Steel Co., Harrisburg, Pa.
Smith, Thomas, Co., 286 Grove St., Worcester, Mass.

WASHERS—Leather
Chicago (Ill.) Rawhide Mfg. Co., 1306 Elston Ave.

WATER SOFTENERS AND PURIFIERS
Scaife, Wm. B., & Sons Co., Ptgh.

WELDING—Electric
Lukenweld, Inc., Coatesville, Pa.
Westinghouse Elec. & Mfg. Co., East Ptgh.

WELDING—Thermic
Metal & Thermit Corp., 120 B'way, N. Y. C.

WELDING AND CUTTING MACHINES AND EQUIPMENT—Oxy-Acetylene
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

WELDING MACHINES—Electric Arc
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., Cleveland.
Westinghouse Elec. & Mfg. Co., East Ptgh.
Wilson Welder & Metals Co., Inc., North Bergen, N. J.

WELDING MACHINES — (Electric Arc) Second Hand
Goodman Elec. Mchry. Co., Newark, N. J.

WELDING MACHINES—Spot
Eisler Electric Corp., 765 So. 13th St., Newark, N. J.

WHEELS—Rolled Steel
Carnegie Steel Co., Pittsburgh.
Illinois Steel Co., Chicago.

WIRE—Aluminum
Aluminum Co. of America, Pittsburgh.

WIRE—Barb
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.

WIRE—Brass, Bronze, Copper, Nickel, Silver or Phosphor Bronze
Michigan Wire Cloth Co., 2117 Howard St., Detroit.
Phosphor Bronze Smelting Co., Philadelphia.
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

WIRE—Electric Heat Resisting
Globar Corp., Niagara Falls, N. Y.

WIRE—Flat, Round, Square or Special Shapes
American Steel & Wire Co., Chicago.
Barnes, Wallace, Co., The, Bristol, Conn.
Page Steel & Wire Co., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.
Webb Wire Works, New Brunswick, N. J.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE—Insulated
American Steel & Wire Co., Chicago.
Roebling's, John A., Sons Co., Trenton, N.J.

WIRE—Mattress
American Steel & Wire Co., Chicago.
Roebling's, John A., Sons Co., Trenton, N.J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.

WIRE—Netting
Roebling's, John A., Sons Co., Trenton, N.J.
Wickwire Brothers, Cortland, N. Y.

WIRE—Piano and Music
Webb Wire Works, New Brunswick, N. J.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE—Special, Drawn Shapes
Rathbone, A. B. & J., Palmer, Mass.

WIRE—Spoke and Crimping
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.

WIRE—Spring
American Steel & Wire Co., Chicago.
Barnes, Wallace, Co., The, Bristol, Conn.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Roebling's, John A., Sons Co., Trenton, N.J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.

WIRE—Stainless Steel
Page Steel & Wire Co., Monessen, Pa.

WIRE—Steel
Wickwire Brothers, Cortland, N. Y.

WIRE—Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
American Steel & Wire Co., Chicago
Lincoln Electric Co., Cleveland.
Metal & Thermit Corp., 120 B'way, N. Y. C.
Page Steel & Wire Co., Monessen, Pa.
Pittsburgh (Pa.) Steel Co.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
Wilson Welder & Metals Co., Inc., North Bergen, N. J.

WIRE CLOTH
Michigan Wire Cloth Co., 2117 Howard St., Detroit, Mich.
Roebling's, John A., Sons Co., Trenton, N.J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE DRAWING MACHINERY — See Wire Mill Machinery and Equipment

WIRE FORMING MACHINERY
Baird Machi. Co., Bridgeport, Conn.
Nilson, A. H., Mach. Co., Bridgeport, Ct.

WIRE NAIL MACHINERY
National Mchry. Co., Tiffin, Ohio.

WIRE PRODUCTS
American Steel & Wire Co., Chicago.
Cuyahoga Spring Co., Cleveland.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Hindley Mfg. Co., Valley Falls, R. I.
Pittsburgh (Pa.) Steel Co.
Titchener, E. H., & Co., Binghamton, N. Y.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE ROPE
American Steel & Wire Co., Chicago.
Leschen, A., & Sons Rope Co., St. Louis, Mo.
Roebling's, John A., Sons Co., Trenton, N.J.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE ROPE FITTINGS
American Steel & Wire Co., Chicago.
Roebling's John A., Sons Co., Trenton, N. J.

WIRE STRAIGHTENING AND CUTTING MACHINERY—Automatic
Franklin Mfg. Co., New Haven, Conn.
Lewis Mch. Co., The, Cleveland, Ohio.
Shuster, F. B., New Haven, Ct.

ZINC—Slab (Spelter)
New Jersey Zinc Co., Inc., The, 160 Front St., N. Y. C.
United Metals Selling Co., 25 Broadway, N. Y. C.

ZINC—Slab
St. Joseph Lead Co., 250 Park Ave., N. Y. C.

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JUST BETWEEN US TWO

All Have Fled But August

OF the forty or fifty gray iron foundries that dotted Manhattan Isle thirty years or so ago, only one remains. The sole victor in the fight against skyscrapers and high taxes is August Mietz, who is still going strong at 87 Elizabeth St.

The Mietz foundry just subscribed, so we now cover Manhattan's gray iron foundry industry like a 7-ft. sheet covers a 5-ft. man.

They Change From One Kind of Quench to Another

"It was one of the best tool and die shops in this section and they are giving up business to open up a retail liquor store." So reports one of our circulation men. "Too bad," he moralizes, "that they are making this change."

Well, it's too bad for the other liquor stores.

Great Givers of Joy Are We

THE director of a rather important machinery-building plant in the Far East writes us:

> *"I can joyfully tell you that I have already made for continuation of my subscription.*
>
> *"Every weak (sic), new copy of Iron Age encourage and cultivate me, that may be my greatest joy now and forever."*

Micrometric Praise

CONTRAST the generosity of that Oriental tribute with the chilly exactness of this barely perceptible pat on the back from an Occidental reader:

> *"The Iron Age is almost a necessity."*

B-r-r-h!

In the Temperate Zone

But not all Nordics are so restrained. From conservative New England a manufacturer of small tools writes:

> *"Have subscribed to Iron Age for fifteen years and consider it No. 1 on our list of trade publications."*

Clap hands!

Our Mouth Is Continually Agape

AFTER shuffling subscription cards year in and year out, you'd think we would get sort of blasé about it all, but our ingenuous nature makes us continue to marvel at the variety of things made by Iron Age subscribers.

Look at this infinite variety of products, picked not exactly at random from the last few weeks' lists of new subscribers: beer barrel washers, coal chutes, slot machines, jewelers' tools, latch needles, doughnut machinery, potato sorters, toy railroads, safety razors, tacks, saw mills, nipples, couches, tacks, butchers' equipment, heat controls, watchmen's clocks, and bridges.

Speaking of Bridge

HERE'S a hand that kept us awake all last Sunday afternoon:

S: None
H: 10 9 8 7 6
D: A K
C: A 10 9 8 7 6

Blank hand

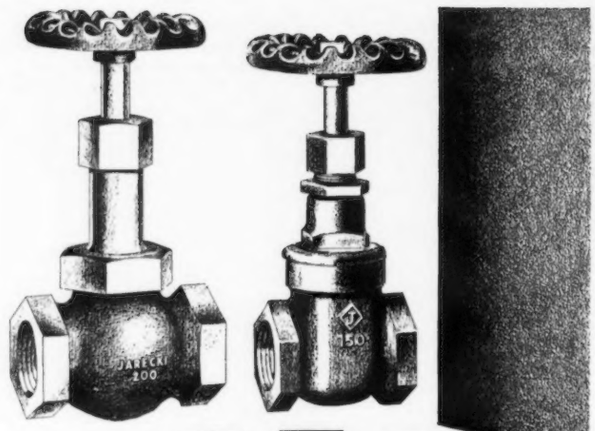
North
West East
South

S: K J 10
H: 5 4 3 2
D: None
C: K Q J 5 4 3

S: A Q 3
H: A K Q J
D: Q J 10 9 8 7
C: None

Hearts are trumps. East leads the king of clubs. If you are smarter than we are you'll be able to figure out how North, the declarer, can take all the tricks.

—A. H. D.



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